Founded in 1832

RAILWAY LOCOMOTIVES AND CARS

MARCH 1954

FOR OFFICERS AND SUPERVISORS RESPONSIBLE FOR DESIGN, CONSTRUCTION AND MAINTENANCE OF MOTIVE POWER AND ROLLING STOCK

formerly RAILWAY Mechanical and Electrical Engineer

82%

THIS IS THE TIME of the year when excitement runs high in our office. Our Girl Friday locks herself in with her trusty adding machine for her annual tussle with the magic percentage figure we've been working for all year.

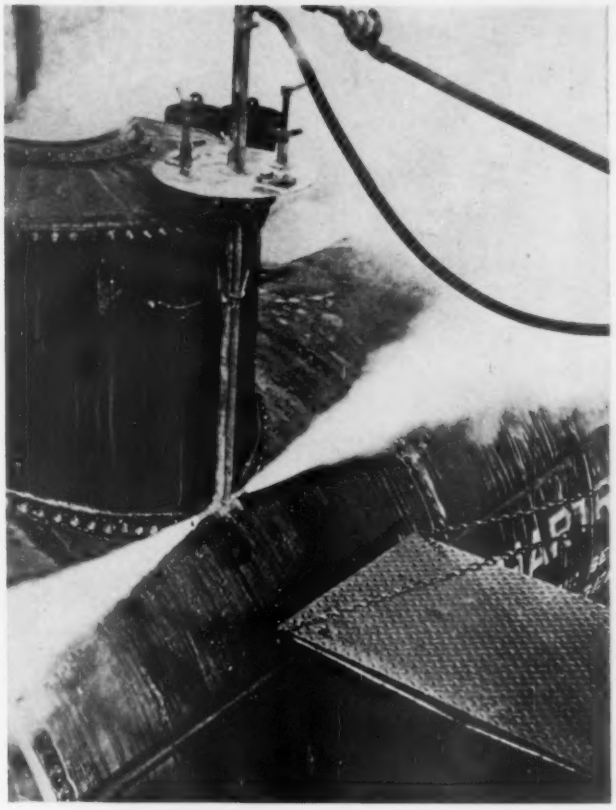
For 6 consecutive years, now, she's come out with a big smile and a happy answer—each year since 1948 more than half of all freight cars ordered for domestic service have been equipped with Unit Trucks.

This year she's happier than ever—in 1953 Unit racked up a whopping 82% of freight car sales. Unit is making good in a big way—for us, and for the American railroads.

UNIT TRUCK CORPORATION

NEW YORK

Tough residue cleaned from tank car interior in record time with Oakite Fogging Unit



This is the sort of cleaning action that goes on inside your tank cars.

Another road finds Oakite's fast, easy, "mechanical" way to remove tank car soil saves time and work . . . speeds turnaround

Confined working space makes cleaning of tank car interiors a difficult job, especially when tough residues must be removed. Such was the case with this railroad. One of its tank car interiors was coated with a heavy, tenacious deposit. To complicate things further, the tanker was needed in a great rush.

The Oakite Man answered the rush call and found the situation ideal for demonstrating the Oakite Fogging Unit. He inserted the Unit into tank car dome. Steam and Oakite Composition No. 24 were fed to Units opposing nozzles. A detergent-laden steam fog blanketed the soil. Quickly the soil melted and rolled to tank car bottom. The condensate was dumped, and car rinsed with steam and water mixture until the drainage came out clean. Car was then finally rinsed and cooled with air and water mixture, and air dried.

Inspected, the car was found completely clean and was quickly approved by the new shipper. In only a few hours, the Oakite Fogging Unit and specialized Oakite material had accomplished a seemingly impossible rush job... and done away with the costly, laborious manual effort formerly required.

Proving that... in railroad cleaning, it pays to call in Oakite.

FREE BOOKLET

can help you save money for your road.

Free 56-page Oakite Booklet is chock-full of ideas for maintenance cleaning — including semi-automatic cleaning of running gear, filter cleaning, manual and mechanical coach washing. Send for your copy today to ...

OAKITE PRODUCTS, INC., 46 Rector Street, New York 6, N. Y.
In Canada: Oakite Products of Canada, Ltd., 65 Front St. East, Toronto, Ont.

OAKITE

RAILWAY DIVISION

How much money could you save

if you didn't have to adjust the slack on each freight car manually?

● Every railroad man should find the answer to this question. If your potential savings are as great as we think they are, you may be able to save many thousands of dollars yearly with the Westinghouse Type D Pneumatic Automatic Slack Adjuster. Trains can be made up faster, put on the road faster, and yard congestion can be reduced.

The Type D slack adjuster requires absolutely no mounting brackets, it is inserted between the cylinder lever and tie rod. No manual adjustment is required for the entire life of the brake shoes, and train shocks cannot cause false take-up of slack.

This completely automatic, completely pneumatic slack adjuster precisely measures brake piston travel. It gives positive slack take-up as soon as brake cylinder piston travel exceeds a predetermined setting. It's a wonderful money-saving, time-saving investment for every railroad.

Westinghouse Air Brake
COMPANY

AIR BRAKE DIVISION WILMERDING, PA.

March, 1954
VOLUME 128
No. 3

RAILWAY LOCOMOTIVES AND CARS

Founded in 1832 as the American Rail-Road Journal.

Published monthly by Simmons-Boardman Publishing Corporation at 1309 Noble St., Philadelphia, Pa. Entered as second-class matter, January 16, 1953, at the Post Office at Philadelphia, Pa., under the act of March 3, 1879. Subscription price to railroad employees only in U. S., U. S. possessions and Canada, $2 one year, $3 two years, payable in advance and postage free. Subscription price to railroad employees elsewhere in the Western Hemisphere, $5 one year, $10 two years. All other countries: $7 one year, $14 two years. Single copies 50¢. Address correspondence concerning subscriptions to Robert G. Lewis, Vice Pres. and Div. of Circulation, 30 Church Street, New York 7.

Editorial and Executive Offices: 30 Church street, New York 7, and 79 W. Monroe street, Chicago 3,. Branch offices: Terminal Tower, Cleveland 13; 1081 National Press bldg., Washington 4, D.C.; Terminal Sales bldg., Portland 5, Ore.; 1127 Wilshire blvd., Los Angeles, 17, Cal.; 244 California St., San Francisco, Cal.; 2909 Maple avenue, Dallas 4, Tex.

Railway Locomotives and Cars is a member of the Associated Business Papers (A.B.P.) and the Audit Bureau of Circulation (A.B.C.) and is indexed by the Industrial Arts Index and also by the Engineering Index Service. Printed in U.S.A.

PRINTED BY PERIODICAL PRESS CORP., PHILA. 23, PA.

170,000 freight cars have been built

ONE of the original 100 covered hopper cars, series 58000, put into service by Seaboard Air Line in 1935. Doors are raised to show their "good-as-new" condition today. Made of USS COR-TEN steel—with a yield point 1½ times that of carbon steel—these doors have superior strength and toughness to stand up under service. The high corrosion resistance of COR-TEN steel is also an important factor that contributes to their unusual durability.

1933 UNITED STATES STEEL USS HIGH STRENGTH STEELS 1953

TWENTY YEARS OF PERFORMANCE

USS HIGH STRENGTH STEEL

better with USS COR-TEN steel since 1933

In phosphate-hauling hoppers on the Seaboard Air Line

18 years of service without renewals or replacements

proves life-increasing properties of USS COR-TEN steel

IN 1935, the Seaboard Air Line Railroad equipped 100 phosphate hopper cars (Series 58000) with USS COR-TEN steel roofs and hopper doors. Despite the fact that in this type of ore transport, roofs and hopper doors bear the brunt of punishment, and though these cars have been in continuous service for the past 18 years, not one door or roof has had to be replaced because of wearing out.

Here is a typical example of COR-TEN steel's ability to minimize maintenance under quite severe operating conditions.

Just consider these facts. Although the phosphate ore is handled dry in these covered hoppers, atmospheric moisture combines with the ore to form corrosive phosphate compounds. As a result, the metal ultimately rusts out—sooner in the case of ordinary steel—very much later with USS COR-TEN steel.

In addition, the hopper doors are subjected to severe abrasive action as thousands of tons of ore grind over the door surfaces during loading and unloading. Yet, Seaboard maintenance records reveal that USS COR-TEN steel has withstood this combined corrosion-abrasion attack for 18 years running—the only maintenance needed has been an occasional coat of paint.

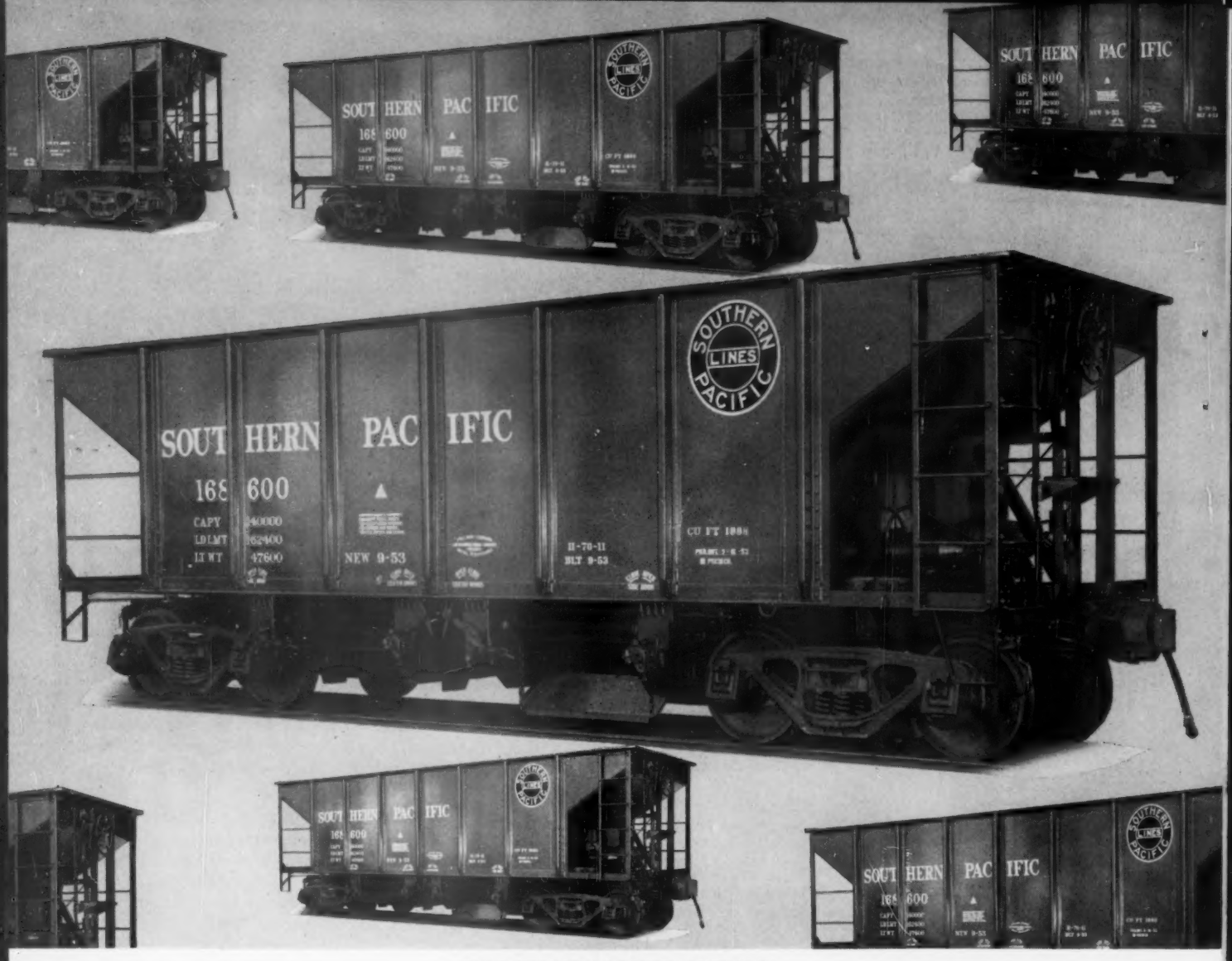
On the basis of this low-maintenance, money-saving performance, Seaboard Air Line has, since 1935, continued to use more and more COR-TEN steel construction. They now have in service 1775 cars built with USS COR-TEN steel roofs and hopper doors. This year, they have ordered 400 more.

If you want your equipment to last longer, cost less to maintain, and cost less to operate, get the facts about construction with USS COR-TEN steel. Our engineers will be glad to show you how readily this famous "steel that does more" can be applied to your designs, how little it costs, and the sound economic reasons that justify its use.

UNITED STATES STEEL CORPORATION, PITTSBURGH · AMERICAN STEEL & WIRE DIVISION, CLEVELAND · COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO
NATIONAL TUBE DIVISION, PITTSBURGH · TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA. · UNITED STATES STEEL SUPPLY DIVISION, WAREHOUSE DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

THE excellent condition of the COR-TEN steel hopper doors, after 18 years' service hauling phosphate ore, is clearly shown in this photograph. COR-TEN steel's high resistance to atmospheric corrosion—4 to 6 times that of ordinary steel, 2 to 3 times that of copper steel—and its greater resistance to abrasion pay off here. Not one of these doors in 100 cars built in 1934 has had to be replaced because of wearing out.

UNITED STATES STEEL



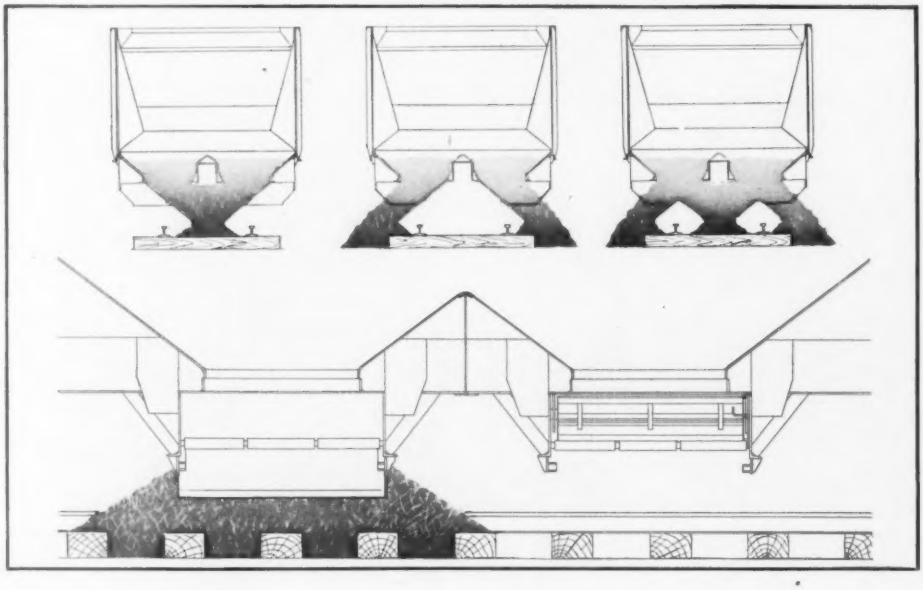
SIDE STAKES LOCATED OUTSIDE

Side stakes are located on the outside of the car. They are automatically arc-welded to the side sheets. This design keeps the interiors smooth and reduces the danger of damage and corrosion. All side sheets are butt-welded together vertically and are automatically arc-welded to the side sill and side plate.

DOOR ARRANGEMENT AND CONTROL

The cars have eight longitudinal doors. The four center doors, controlled from either side of the car, are operated as two units. Each longitudinal half of the car acts as a unit to dispose of the load between the rails.

The four side doors operate as units to dispose the load outside the rails. Both side and center doors can be stopped safely in any desired position.



500 NEW ballast cars

Welded construction gives greater control over ballast distribution

The all welded construction of these ballast cars, being built at Pullman-Standard's Butler, Penna. plant, eliminates lap joints and rivet heads. Thus, the interiors are completely self-clearing which permits greater control of ballast distribution.

These cars are typical of the many types of special service cars which roll out of Pullman-Standard's shops every year. They are the product of over one hundred years of car building experience combined with the most modern tools and techniques.

Today, many railroads are taking advantage of Pullman-Standard's unmatched research and production facilities. They have found that it is more economical to have cars produced—whether built to our design or their own specifications, where a specialty of car-building permits many custom-designed, cost-reducing machines and fixtures.

YOUR NEEDS CREATE THE PULLMAN "STANDARD"

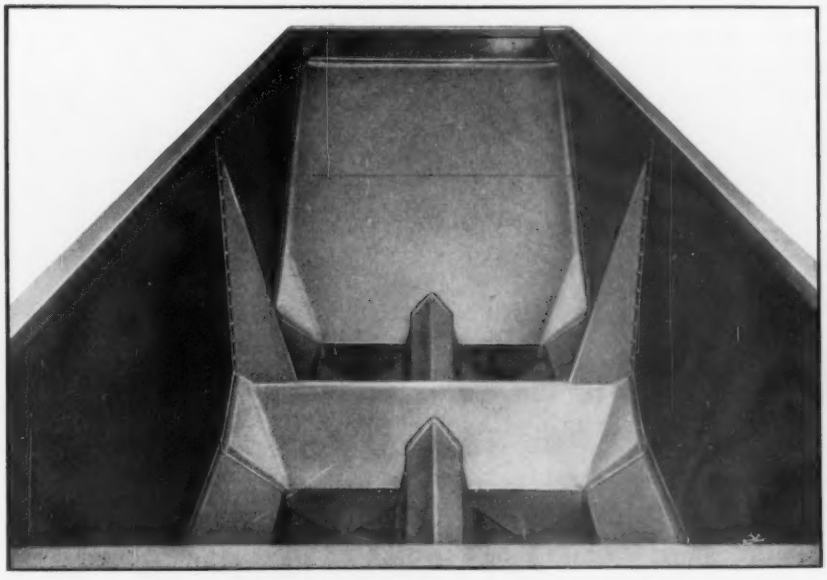
PULLMAN-STANDARD

CAR MANUFACTURING COMPANY

SUBSIDIARY OF PULLMAN INCORPORATED

79 EAST ADAMS STREET, CHICAGO 3, ILLINOIS

BIRMINGHAM, PITTSBURGH, NEW YORK, SAN FRANCISCO, WASHINGTON



FREE FLOW OF BALLAST

Free flow is assured by design and construction. The end floor sheets slope 30° from bolster to door. Floor sheets are secured by welding. Side slope sheets extend from the side sheets to door opening and from slope floor sheet at end to crossridge floor sheets. They are sloped 36° and are assembled by welding. There are two inside braces.

NEW!

SPOT WELD without jigs or back-up plates

Now you can spot weld with complete maneuverability — and as fast as you can pull the trigger — with the new portable AIRCOSPOT® Gun.

With **AIRCOSPOT,** Air Reduction's new inert-gas-shielded spot welding unit, you simply touch the water-cooled gun to one side of the work and pull the trigger. In about a second you have a spot weld. It will be a good one, too, because **AIRCOSPOT'S** inert gas shield completely protects the hot metal from contamination by the air.

Write today for prices and folder that provides detailed information.

AIRCOSPOT welds all sheet steels — including stainless up to 3/32"—to bottom sections of varying thickness.

AIRCOSPOT is fast. Once the controls are set, you can make thirty or more welds a minute.

AIRCOSPOT is easy to use. Operators need no special training. The welding cycle is fully automatic.

AIRCOSPOT is handy. Gun weighs four pounds, is nine inches long. All connections—current, gas and water—are through a single control panel.

AIRCOSPOT is rugged. No abuse-sensitive high frequency or electronic circuits, because Gun is of electromechanical design.

at the frontiers of progress you'll find

AN AIR REDUCTION PRODUCT

AIRCO®

OFFICES IN MOST PRINCIPAL CITIES

AIR REDUCTION

60 East 42nd Street • New York 17, N. Y.

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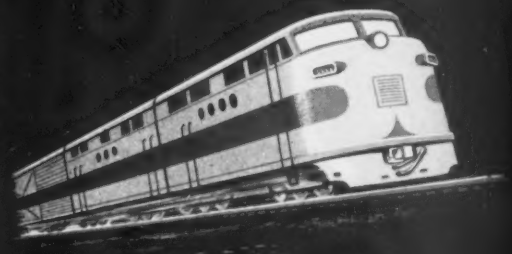
Exide



Exide-Ironclad STARTING BATTERIES FOR DIESEL ELECTRIC LOCOMOTIVES

QUICK BREAKAWAY and fast acceleration of engine to firing speed.

HIGH POWER RESERVE *at all times* for positive operation of control equipment.

HIGH AVAILABILITY—uninterrupted on-line service.

EASY to change and keep charged.

CLEAN, quiet, vibrationless operation.

Exide-Ironclad CAR-LIGHTING AND AIR-CONDITIONING BATTERIES

AMPLE POWER for entire car-lighting and air-conditioning loads . . . uniform voltage at proper values throughout run.

STEADY LIGHTS AND COOL CARS even during long stops.

UNINTERRUPTED SERVICE—trouble-free performance—withstand vibration, shock, service variations and temperature differences.

MEET ALL REQUIREMENTS of car design and electrical loads. Easily changed or recharged in yard. Safe, clean, quiet.

Exide IS YOUR BEST BATTERY BUY... AT ANY PRICE

FOR ALL STORAGE BATTERY JOBS IN ALL RAILWAY APPLICATIONS

Exide Batteries for Railway Service meet the most exacting requirements. Each is designed for a specific job. Each assures *dependable performance* in its particular application—diesel starting, car-lighting, air-conditioning, signaling, electric communications, materials handling, trucks and buses. Wherever used, you can count on Exide for *extra long battery life, with inherent safety and low over-all costs.*

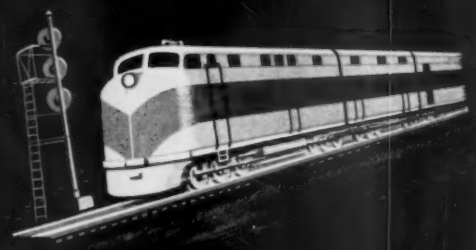
Exide-Ironclad BATTERIES FOR MATERIALS-HANDLING TRUCKS

INSTANT SURGE OF POWER, plus finger-tip control, split-second handling, easy maneuvering, accurate spotting.

ROUND-THE-CLOCK PERFORMANCE—no mechanical troubles, no unscheduled down time.

UNIFORM SPEED straight through to end of shift.

SIZES for all types and makes of battery-electric trucks—hand and rider.



Exide-Manchex BATTERIES FOR SIGNALS, SWITCHES, COMMUNICATIONS

INSTANTANEOUS POWER for bright, steady signal lights . . . dependable operation of switches, relays, locks, indicators and allied apparatus.

AMPLE RESERVE for any emergency conditions of operation.

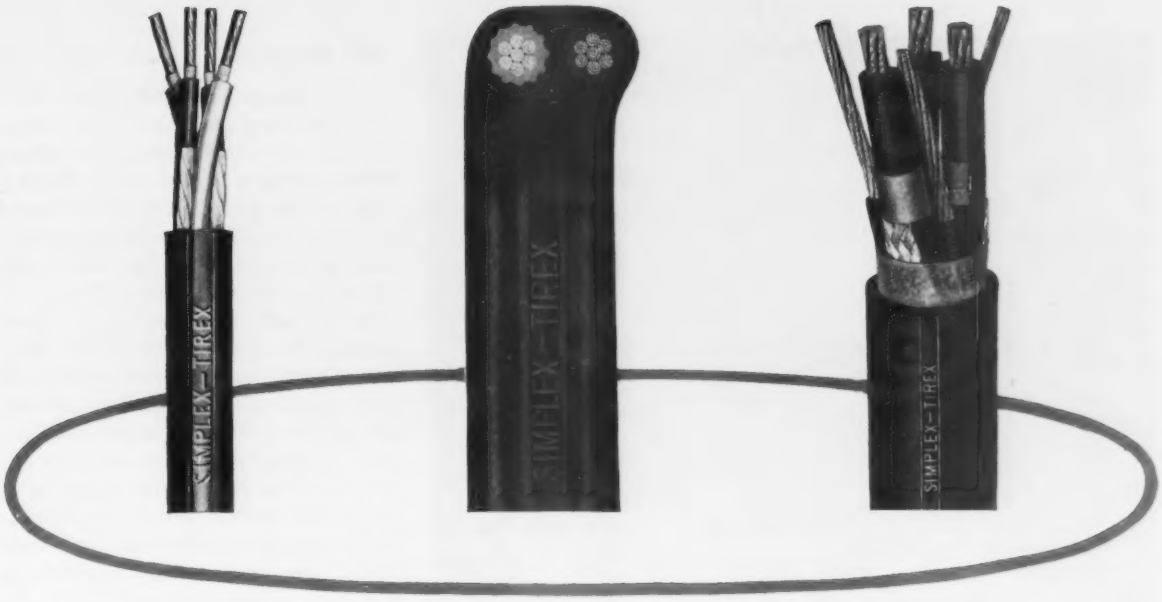
POSITIVE OPERATION. Power is delivered at needed rates, providing steady performance with high sustained voltage.

HIGH CAPACITY in compact space.

Exide INDUSTRIAL DIVISION

THE ELECTRIC STORAGE BATTERY COMPANY, Philadelphia 2 • *Exide Batteries of Canada, Limited,* Toronto

TIREX IS A FAMILY



To a great many people the name "TIREX" means a small, flexible, long-wearing portable cord. Actually, TIREX is the name of a family of portable cords and cables. The family ranges in size from a single conductor #18 cord, all the way up to a 3-conductor Type SH-D cable for voltages in excess of 10,000 V.W.P.

TIREX cords are made in sizes from 18 to 10, from single to eight conductors in Type SO, and from two to four conductors in Type SJO. There are TIREX Mine Cords, as well as heavy duty shielded cords.

In the cable field there are single and multi-conductor cables, shielded or unshielded, Types W or G, SH-A, SH-B, SH-C and SH-D.

Your local distributor has many of the TIREX cords and some of the TIREX cables in stock. He can get most of the other stock type TIREX cords and cables for you in a comparatively short time. Be sure to see your local distributor whenever you need portable cords and cables.

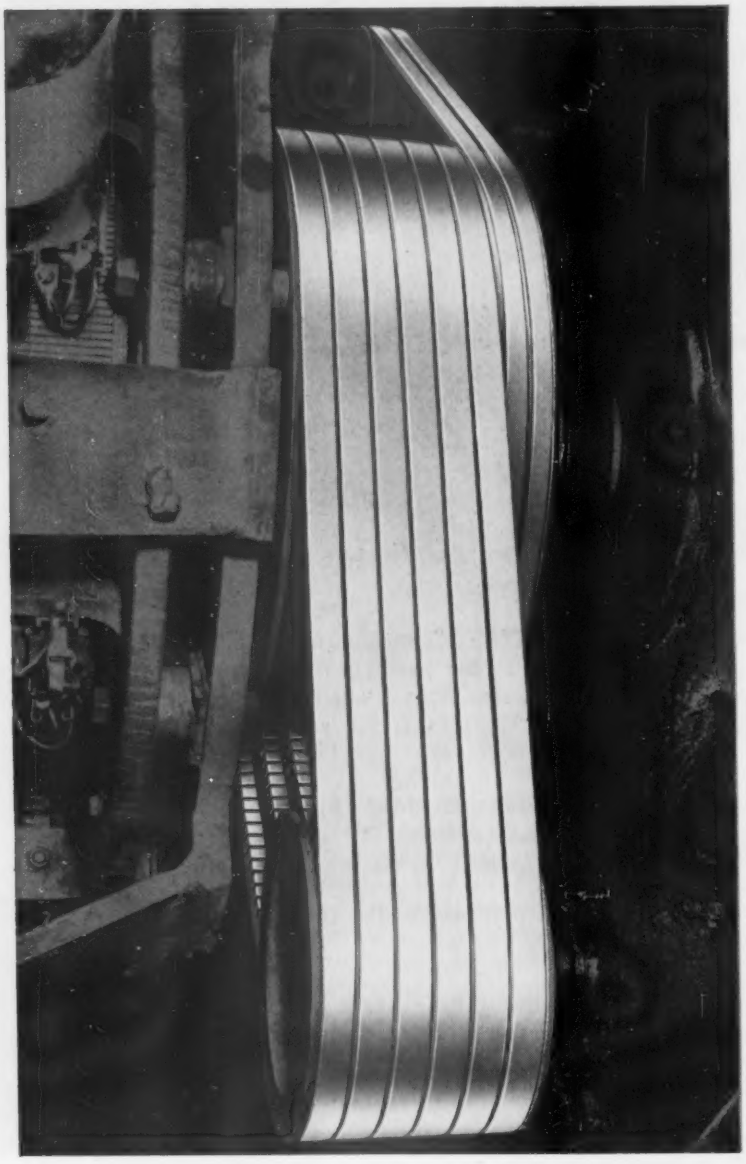
SIMPLEX-TIREX IS A PRODUCT OF SIMPLEX RESEARCH

SIMPLEX-TIREX

SIMPLEX WIRE & CABLE CO., 79 SIDNEY ST., CAMBRIDGE 39, MASS.

Dayton Cog-Belts* end loss of

One of nation's major railroads eliminated generator down-time caused by belt slippage and reduced power interruptions 600% by changing drives to Dayton Cogs

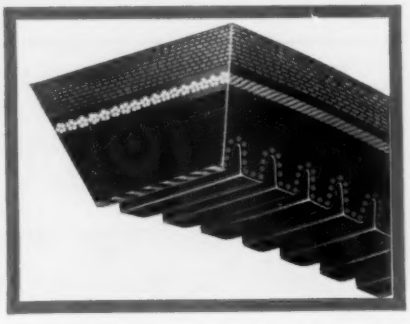


THE PROBLEM

Eighteen road-switching diesel locomotives were placed in service by a leading railroad to haul morning and evening commuter trains in addition to their regular freight runs. Each was equipped with two 12½ KW, 32-volt, D. C. generators to power fans and fluorescent lighting for the commuting passengers.

In the first three months, it became obvious the generators were producing below needed capacity and blown fuses resulted in frequent power interruptions. Investigation revealed that generator belt drive slippage was responsible for the trouble. The belt drives, operating at 2000 FPM directly off the crankshaft, were subjected to conditions that encouraged slippage and deprived the generators of power. Pulsation, presence of oil, dirt and heat—all contributed to overburden the drives beyond capacity. Belts lasted from 3 days to 3 months (maximum) in actual operation depending upon when the slippage began.

Slippage on one generator threw the load to the second and the overload blew the fuse. The second generator, in turn, shifted the load back to the first—already incapable of handling a normal load—and that, too, would blow its fuse. Result—no power from either generator and no lights or fans for the commuting passengers. An immediate remedy was necessary so the railroad called in Dayton Railway Field Engineers to find a solution.



The Dayton Cog-Belt has great tensile strength, amazing flexibility

The only raw edge V-Belt with the preformed cog built in as an integral part of the belt. Provides remarkable flexibility and a highly tenacious grip. Made with three prime sections: (1) Tension Section: "bias cut" fabric for greater "give" without strain; (2) Compression Section: Patented Cog construction takes up compression, and gives belt greater flexibility and longer life; (3) Neutral Section of high tenacity rayon cord gives added strength, maximum stretch.

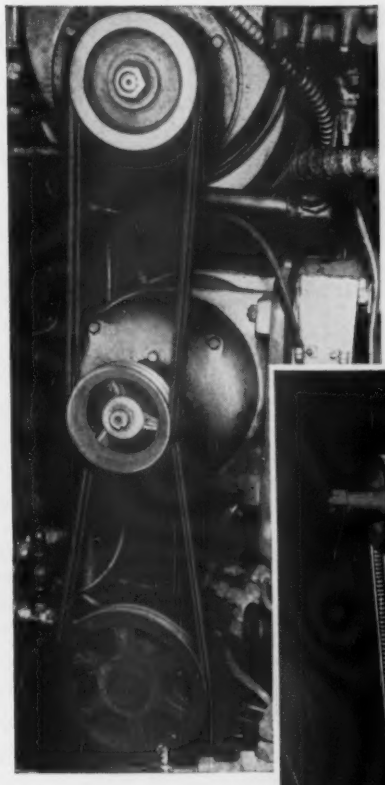
diesel auxiliary generator power

THE SOLUTION

The mechanical and physical requirements to be met in this situation indicated to Dayton Engineers that the solution lay in the use of high capacity belts capable of delivering power under the most adverse conditions. It was obvious that additional belts could not be added to the drive because of space limitations.

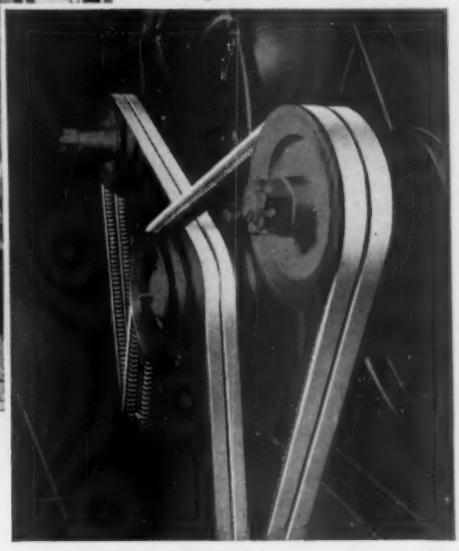
Dayton Engineers recommended Cog-Belts that deliver 40% more H.P., size for size, to do the job. The railroad installed them on all diesels with remarkable results. The Dayton Cog-Belts measured up to all expectations . . . slippage stopped . . . excessive breakage was eliminated. Later inspection disclosed the Cog-Belts completely soaked with oil, yet no slippage was in evidence. When finally replaced, Dayton Cog-Belts had set a record of 18 months of low-cost, economical performance—a 600% reduction in power interruptions.

This railroad has learned the advantage of Dayton's Railway Field Engineering Service on a problem. If you have one, too, just write for complete assistance to Dayton Rubber Co.



Flash Boiler Drive
Dayton V-Belts deliver full rated power with less maintenance at lowest cost.

Radiator Fan and Blower Drive
Dayton V-Belts are ruggedly constructed of specially processed materials to withstand grueling punishment.



There's a Dayton V-Belt for every diesel need

Dayton V-Belts are original equipment on 90% of all diesel locomotives built in the United States. Endless V-Belts, Cog-Belts, Connector V-Belts—whatever your need—there's a Dayton V-Belt drive that will give you better service, longer life, more economical operation.

Equally important, once Dayton V-Belts are installed, they're ever under the watchful supervision and inspection of Dayton's Railway Field Engineers who follow up equipment in the yards—your guarantee of the finest operating service on every V-Belt drive. For complete V-Belt information, write direct to: Dayton Rubber Co., Railway Division, Dept. 202, Dayton 1, Ohio.

Railway V-Belts by

Dayton Rubber

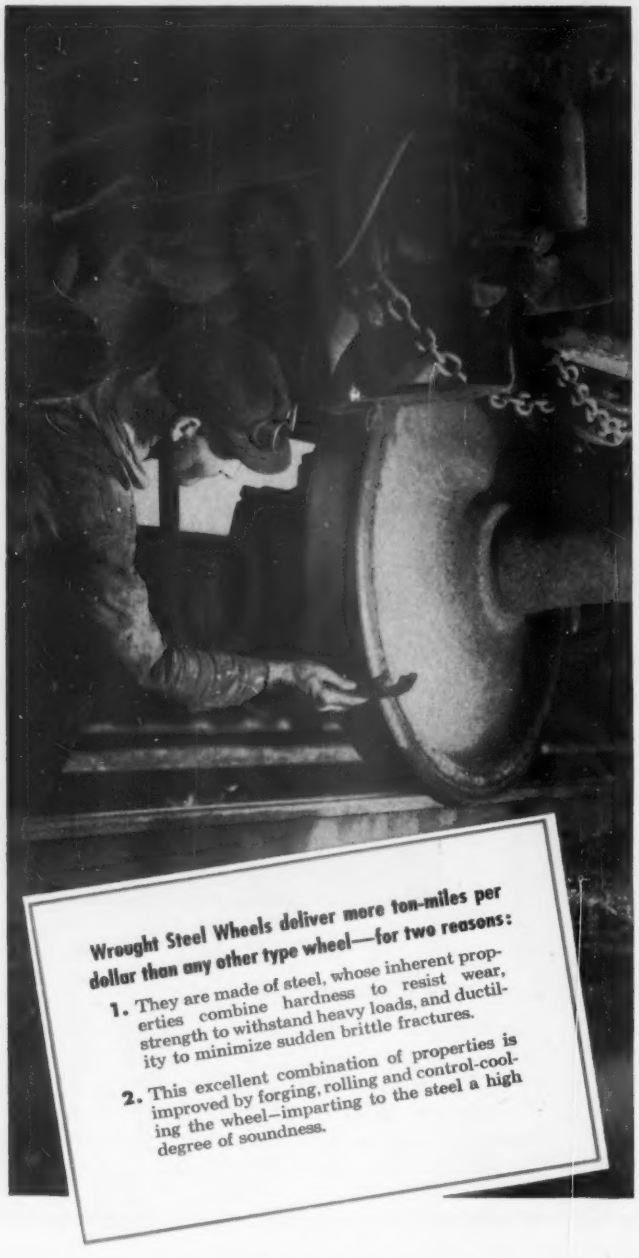
Since 1905

World's Largest Manufacturer of V-Belts

DAYTON RUBBER COMPANY • RAILWAY DIVISION • DAYTON 1, OHIO

With USS One-Wear WROUGHT Steel Wheels

YOU SAVE MONEY FOUR WAYS



Wrought Steel Wheels deliver more ton-miles per dollar than any other type wheel—for two reasons:

1. They are made of steel, whose inherent properties combine hardness to resist wear, strength to withstand heavy loads, and ductility to minimize sudden brittle fractures.

2. This excellent combination of properties is improved by forging, rolling and control-cooling the wheel—imparting to the steel a high degree of soundness.

BECAUSE they are made of *Wrought* steel, USS One-Wear Wheels are far stronger, safer, more durable and more economical than ordinary wheels, and will actually average from 200,000 to 300,000 miles or more in normal freight car service.

Consequently, One-Wear *Wrought* Steel Wheels offer you these four cost-cutting advantages:

1. **Lower wheel cost per year.** Although the initial cost of One-Wear Wheels is slightly greater than ordinary type wheels, their far greater length of life in any given service will reflect a *substantially lower annual cost* than that of the ordinary wheel.

2. **Lower labor costs due to reduced maintenance.** Elimination or reduction of labor requirements represents one of the best ways to save money today. Maintenance costs for cars equipped with wear-resistant *Wrought* Steel Wheels are considerably lower, as they require far less wheel servicing than cars with other kinds of wheels.

3. **More Revenue.** A car rolling on One-Wear *Wrought* Steel Wheels spends more time in service, and less time on a repair siding, resulting in increased revenue to the railroad.

4. **More Payload.** One-Wear Wheels are far lighter than ordinary wheels. Eight *Wrought* Steel Wheels under a 50-ton capacity car will save approximately 1,520 lbs. of unsprung weight, which can be directly converted into additional payload capacity — or it can mean a savings in fuel due to the decreased load.

Greater safety, longer service, higher mileage, less weight . . . all at lower cost. You can't beat that for the best deal in wheels.

These two strategically located complete wheel shops are ready to fill your orders for *Wrought* Steel Wheels: McKees Rocks (Pittsburgh), Pennsylvania, shop, serving the East and Southeast, and the Gary, Indiana, shop, supplying the Western and Southern Lines.

UNITED STATES STEEL CORPORATION, PITTSBURGH, PA. • COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO
TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA. • UNITED STATES STEEL EXPORT COMPANY, NEW YORK

USS WROUGHT STEEL WHEELS

USS

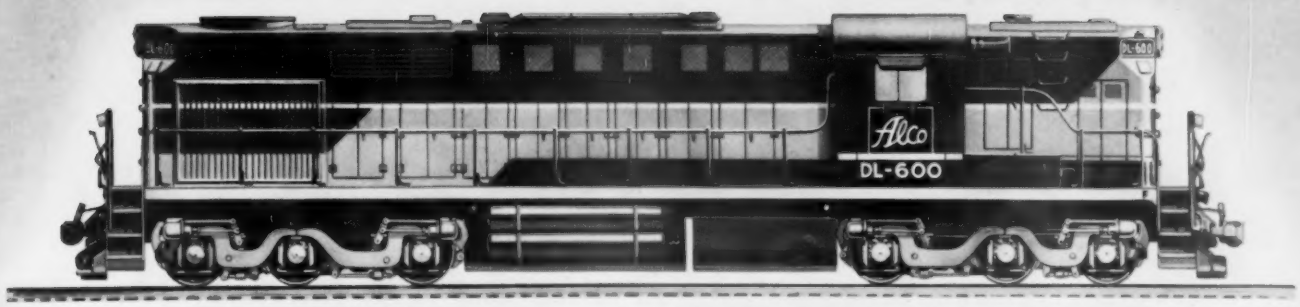
4-639

UNITED STATES STEEL

presenting...

The ALCO

DL-600



. . . the new high-speed, all-purpose locomotive with the highest continuous and short-time tractive ratings available on any diesel-electric locomotive unit today

. . . the most versatile locomotive ever designed

Alco

The New Alco DL-600

Gives You More Speed, More Power, Greater Versatility – At Less Cost

. . . in high-speed freight and passenger service . . . heavy-duty switching service . . . heavy-duty transfer service . . . mine haul service . . . hump service

This new high-output, all-purpose locomotive, the latest development in modern motive power, produces at 65 mph gearing the highest continuous tractive effort—79,500 lb—and the highest short-time tractive effort of any diesel-electric unit today. *Its single diesel engine, using one generator and one electrical system,* is the improved 16-cylinder V-Type Alco engine, conservatively rated at 2250 horsepower, providing parts interchangeability with other Alco locomotive engines. The DL-600 enables you to haul present tonnages at higher speeds and haul *heavier* tonnages at present speeds *with lower operating costs.*

2  DL-600's Will Normally

Do What 3  4-Motor

Units Will Do...With These Advantages:

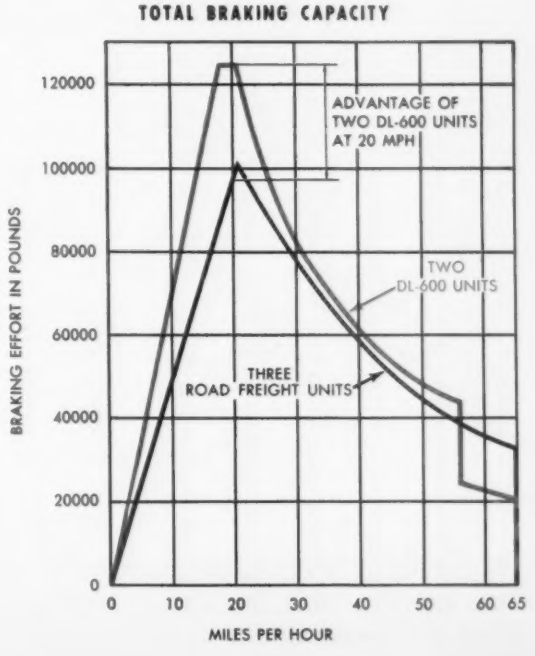
- *SUBSTANTIALLY LESS ORIGINAL INVESTMENT* — Two Units to Buy Instead of Three
- *SUBSTANTIALLY LESS OPERATING COST* — Two Units to Operate Instead of Three
- *SUBSTANTIALLY LESS MAINTENANCE COST* — Two Units to Maintain Instead of Three
- *MORE POWER — TO DO MORE — AT LESS COST*
- PLUS: 15% shorter length
  Higher continuous tractive effort
  Same number of traction motors (12) in only 4 trucks
  25% more dynamic braking effort than three 4-motor units

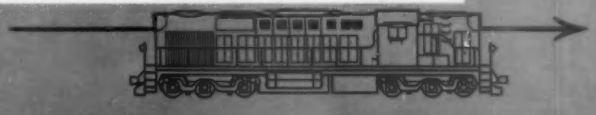
MORE BRAKING POWER AT ALL SPEEDS

The new DL-600 gives you (1) the greater flexibility of all-purpose design, (2) interchangeability of components with other Alco locomotives, and (3) the most powerful dynamic braking—3400 hp—on the road today.

At most speeds the DL-600 exerts approximately 75 per cent more dynamic braking effort than a standard freight unit of any other manufacturer.

At speeds from 18 to 65 mph the DL-600 exerts more dynamic braking effort than any other diesel-electric ever built. At 50 mph, for example—where capacity on some diesel-electrics may drop to zero—a single DL-600 still has an available braking effort of 24,300 lb.





The DL-600 cab is designed for the comfort and safety of the operating crew — with emphasis on roominess, visibility and low noise level.

ALCO DL-600 Condensed Specifications

Continuous tractive effort	
65 mph gearing	79,500 lb
75 mph gearing	69,800 lb
80 mph gearing	65,200 lb
Short-time tractive effort	107,400 lb for 4 minutes
Starting tractive effort	97,500 lb at 25% adhesion
Weight, maximum	390,000 lb
Weight, minimum	325,000 lb
Brakes	clasp type
Dynamic braking capacity	3400 hp max.
Height, maximum	14′ 8⅜″
Width, maximum	10′ 1⅝″
Length, inside knuckles	66′ 5″
Diesel engine—ONE V-type 16-cylinder turbosupercharged	2250 hp
Trucks	two 6-wheel, 3 motor
Wheel diameter	40″
Lube oil	250 gal
Fuel oil	1350 gal
Fuel oil, without boiler	2400 gal
Engine cooling water	280 gal
Sand	40 cu ft

MAIN COMPONENTS of the ALCO DL-600

Diesel engine . . . . . the improved Model 244 engine—now in service in thousands of Alco locomotives throughout the world . . . with new water-cooled turbosupercharger system, new hardened crankshaft.

Traction generator . . . . . interchangeable with generators on other Alco locomotives but with higher current capacity.

Traction motors . . . . . the same rugged, high-output motors installed on all Alco road locomotives.

Dynamic braking . . . . . highest capccity available anywhere . . . extremely compact blower-resistor assembly . . . automatic control.

Three-motor trucks . . . . . based on 12 years' design and operating experience . . . more than 1000 three-motor Alco trucks in service . . . all motors readily accessible for servicing.

For complete details on this *better motive power for greater earning power*, contact your nearest Alco locomotive representative.

Alco

AMERICAN LOCOMOTIVE COMPANY

Sales and Service Offices in New York, Chicago, Cleveland, St. Louis, San Francisco, and Washington, D. C.

EASIEST to install...
EASIEST to maintain!
HYATT freight car boxes

Hyatt journal boxes are ready to install just as they come from the factory!

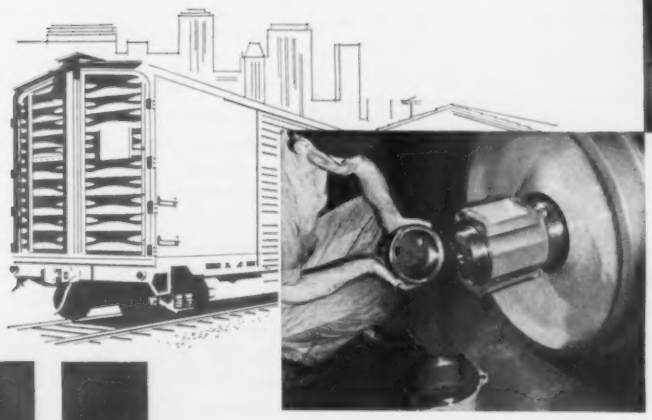
You invest in roller bearings to eliminate the hot box problem. *But over the long haul, Hyatt's ease of installation and maintenance is equally important!*

Installation of Hyatt boxes is a one-man job, and takes only a few minutes. No special tools are required and *bearing adjustments are not necessary!* The box is simply slipped onto the axle (over the one-piece inner race), locked into position, and lubricated. That's all.

Disassembly, naturally, is equally simple. *Press fits are not disturbed,* either when removing a box or a wheel, and because spare axles and wheels need to be fitted with inner races only, *spare parts inventory is substantially reduced.*

Hyatt Journal Boxes are ready to install just as they come from the factory. Simply remove shipping cover and slip box onto inner race. There are no pre-assembly adjustments!

One-piece inner race is heated uniformly to 300°-325° F, slipped on the journal, and shrunk into position. No spacers or mounting fixtures are required.



After box is applied to axle, front cover is removed and locking cup is bolted to axle-end. Using a grease gun, lubricant is added through fitting and the box is ready to roll!

HYATT

STRAIGHT BARREL TAPER

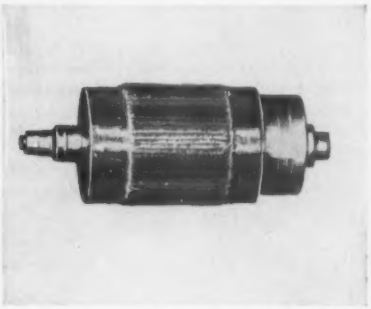
ROLLER BEARING JOURNAL BOXES

HYATT BEARINGS DIVISION • GENERAL MOTORS CORPORATION • HARRISON, NEW JERSEY

IRVINGTON
INSULATING VARNISH DIGEST

New Varnish Has Very High Strength, Resists Vibration

A new insulating varnish, designated as Irvington No. 140, has been specifically formulated to provide a high degree of electrical and physical protection on windings exposed to extreme mechanical stresses. Because of its high strength, this new varnish prevents coil or wire movements on units operating under conditions of severe vibration.



Armatures for traction motors and generators on Diesel-electric trains are among potential railroad uses for Irvington Varnish No. 140.

Railroad Applications

Major applications of Irvington No. 140 in the railroad field are expected to be found in the impregnation of windings on Diesel-electric traction motors and generators, where its strength and ability to resist vibration are especially important.

Other service advantages offered by No. 140 are its excellent electrical properties and its resistance to high temperatures and the effects of water, oils, acids and alkalies.

High Stability

This varnish also displays excellent stability, both during storage and in the dip tank. Use of a relatively mild solvent minimizes the danger of any attack by the varnish on the components of the windings.

Vacuum-Pressure Varnish Application Penetrates Windings More Completely

Method Extracts Air from Pores, Capillary Vessels; Results in Better Insulation of Electrical Windings

While satisfactory results in the impregnation of electrical windings by insulating varnishes can frequently be obtained with the relatively simple equipment used for dipping procedures, more effective penetration results from the use of the vacuum-and-pressure method. In this type of application, air is first evacuated from the impregnating tank. Varnish is then pumped from a storage tank into the impregnating tank, and pressure is applied.

Internal curing varnishes, which cure throughout by polymerization, are particularly well adapted to make most effective use of the thorough penetration resulting from the vacuum-pressure method.

Equipment of this type, designed for application of vacuum and pressure within the impregnating tank, assures more effective penetration of windings by insulating varnishes

Preheating of Work

Because these internal curing varnishes tend to increase in viscosity at elevated temperatures, the recommended procedure is to preheat the work in an oven, rather than in the impregnating tank itself. This procedure decreases the danger of thermal shock to the varnish, which might occur on coming into contact with a heated impregnating tank.

The preheated pieces should be transferred from the oven to the impregnating tank as quickly as possible to prevent cooling.

Vacuum and Pressure Conditions

After closing the cover of the impregnating tank, a vacuum of not less than 28 inches should be maintained for about one hour. After this period, varnish should be pumped from the storage tank to the impregnating tank until the work pieces are submerged.

After immersion, the impregnation chamber should be exposed to atmospheric or abnormal pressure. If abnormal pressures are necessary an inert gas is recommended. Units should remain in the varnish for approximately one hour.

Procedure will vary slightly for different types of windings. Recommendations for specific applications are available on request from Irvington.

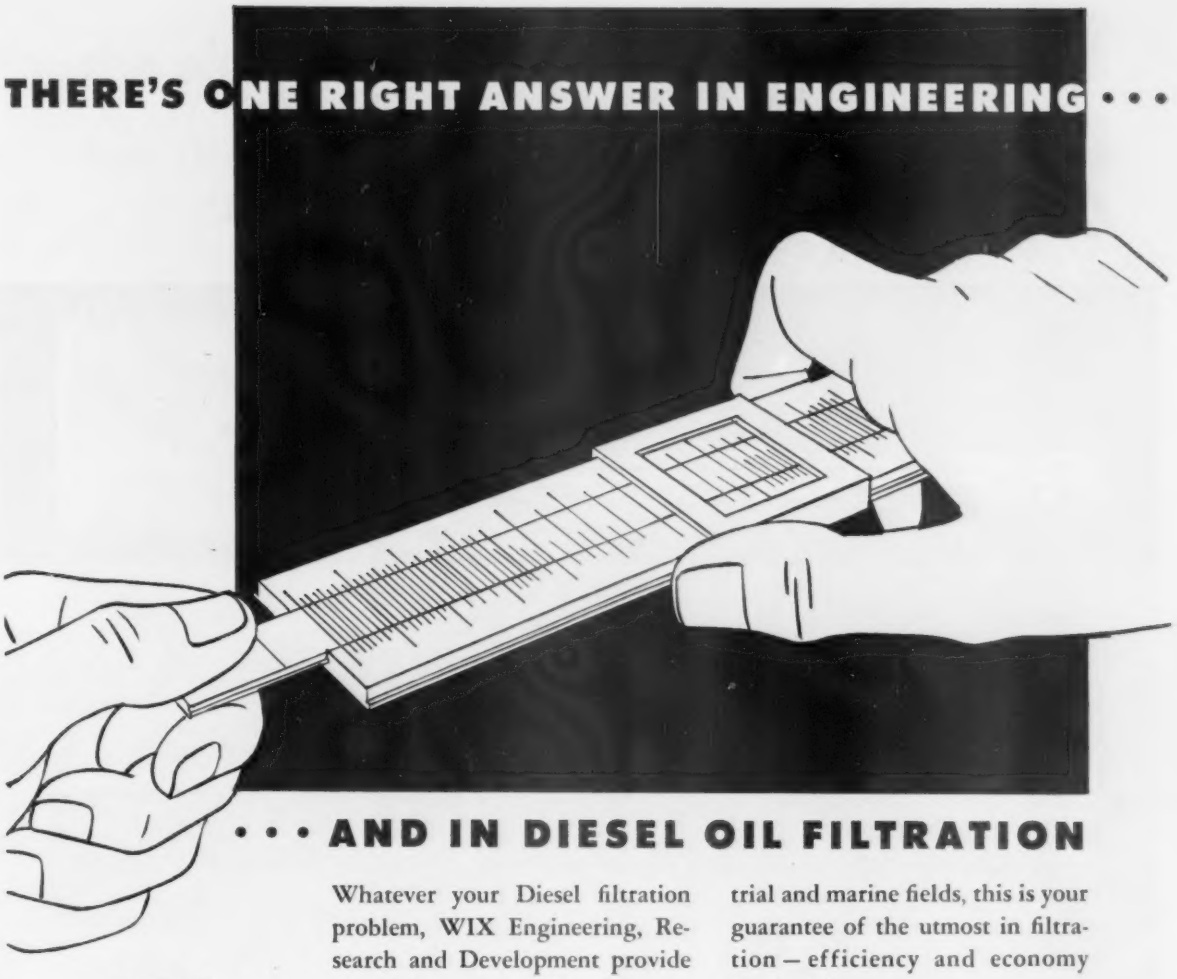
Design of Baking Oven Important in Results

Baking ovens for the curing of insulating varnishes should be provided with means for carrying off solvent vapors. A well designed ventilating system is required.

The oven should provide uniform, dry heat with proper temperature control. Gas, steam or electricity may be used as the means of heating. For increased curing speed in continuous-line production, infrared heating may be used, particularly for the curing of the internal drying types of varnish.

(For information, write Varnish Dept., Irvington Varnish & Insulator, Div. of Minnesota Mining & Mfg. Co., Irvington, N. J.)

THERE'S ONE RIGHT ANSWER IN ENGINEERING • • •



• • • AND IN DIESEL OIL FILTRATION

Whatever your Diesel filtration problem, WIX Engineering, Research and Development provide the right answer with slide-rule precision. For fuel or lube oil, yard engine or main line locomotive, varying operating or climatic conditions, WIX Oil Filter Cartridges stand out in quality and service.

WIX performs all manufacturing operations, carefully supervises every step from raw material to finished Product. Supported by extensive Laboratory facilities and constant field testing, and with the benefit of many years' experience in the railroad, automotive, industrial and marine fields, this is your guarantee of the utmost in filtration – efficiency and economy combined.

Tested WIX Filtrants keep oil cleaner for far longer periods. WIX Engineered Cartridge construction assures precise fit, ease of installation and extended service. And, WIX warehouse stocks provide convenient, immediate service.

Let WIX Engineering solve your filtration problems with Cartridges designed for the conditions under which your Diesels operate. Write for complete information today.

ENGINEERED FILTRATION

Selection of "Prescription" Filtrants: Cotton Threads, Blended Cotton Threads, Felted Paper.

●

Uniform volume, density packed in one-piece Sock. Integral End-Seal or Grip-Seal Cartridge construction.

●

Spring-reinforced center tube, slotted for greater, more even flow rates.

●

Tin-plated metal parts. Bale-type handles for easy installation and servicing.

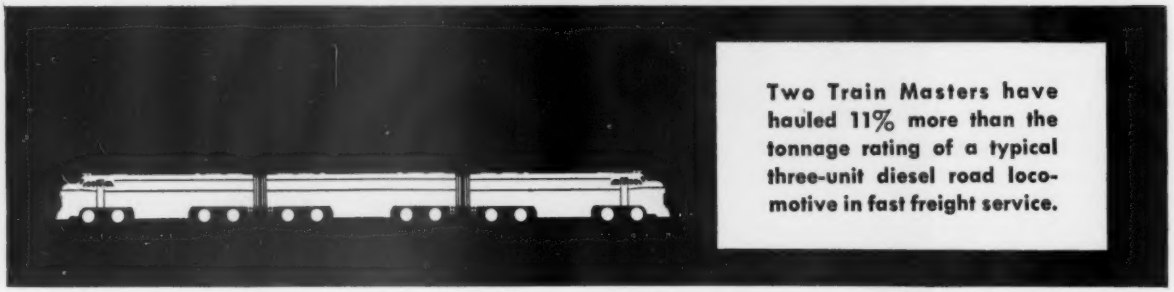
ENGINEERED wix FILTRATION

WIX CORPORATION • • • • • GASTONIA • N • C

WAREHOUSES

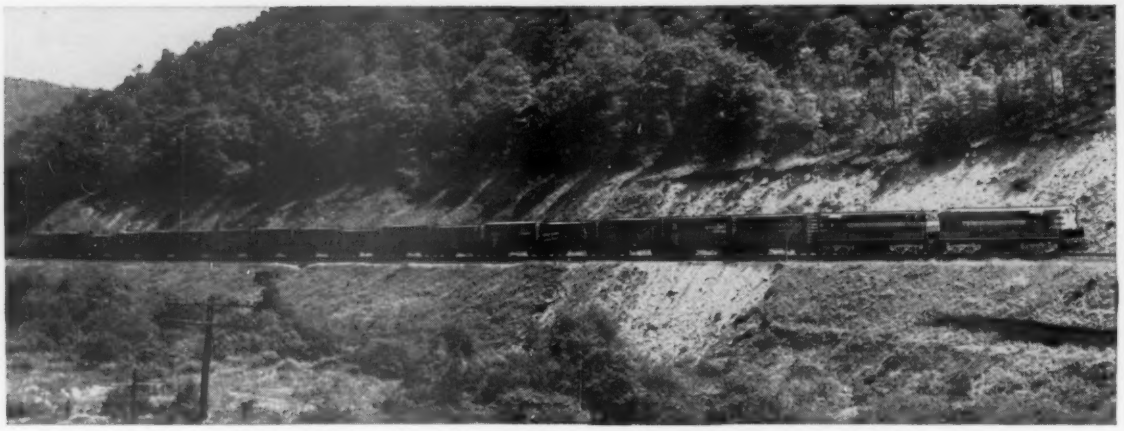
GASTONIA • NEW YORK • SACRAMENTO
ATLANTA • DES MOINES • ST. LOUIS

in Fast freight service



Two Train Masters have hauled 11% more than the tonnage rating of a typical three-unit diesel road locomotive in fast freight service.

A sound investment . . . Diesel Motive Power
Your soundest investment . . . Train Masters



TRAIN MASTER

. . . trend maker in today's move toward more powerful . . . more useful Diesel Motive Power.

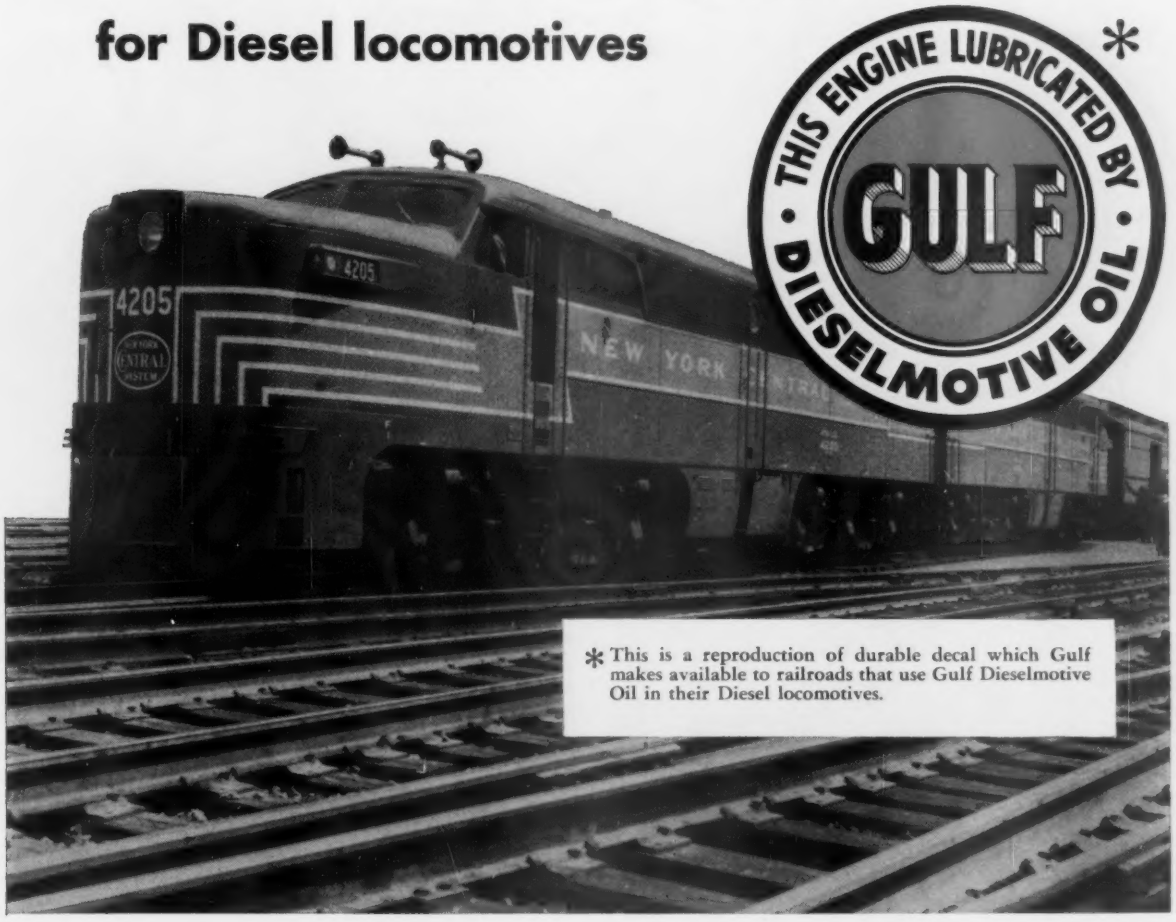
Fairbanks, Morse & Co., 600 S. Michigan Ave., Chicago 5, Ill.

FAIRBANKS-MORSE

a name worth remembering when you want the best

DIESEL LOCOMOTIVES AND ENGINES • RAIL CARS AND RAILROAD EQUIPMENT • ELECTRICAL MACHINERY • PUMPS • SCALES • WATER SERVICE EQUIPMENT • HAMMER MILLS • MAGNETOS

the sign of GOOD lubrication for Diesel locomotives



* This is a reproduction of durable decal which Gulf makes available to railroads that use Gulf Dieselmotive Oil in their Diesel locomotives.

Here's how Gulf Dieselmotive Oil helps keep maintenance costs down, availability up:

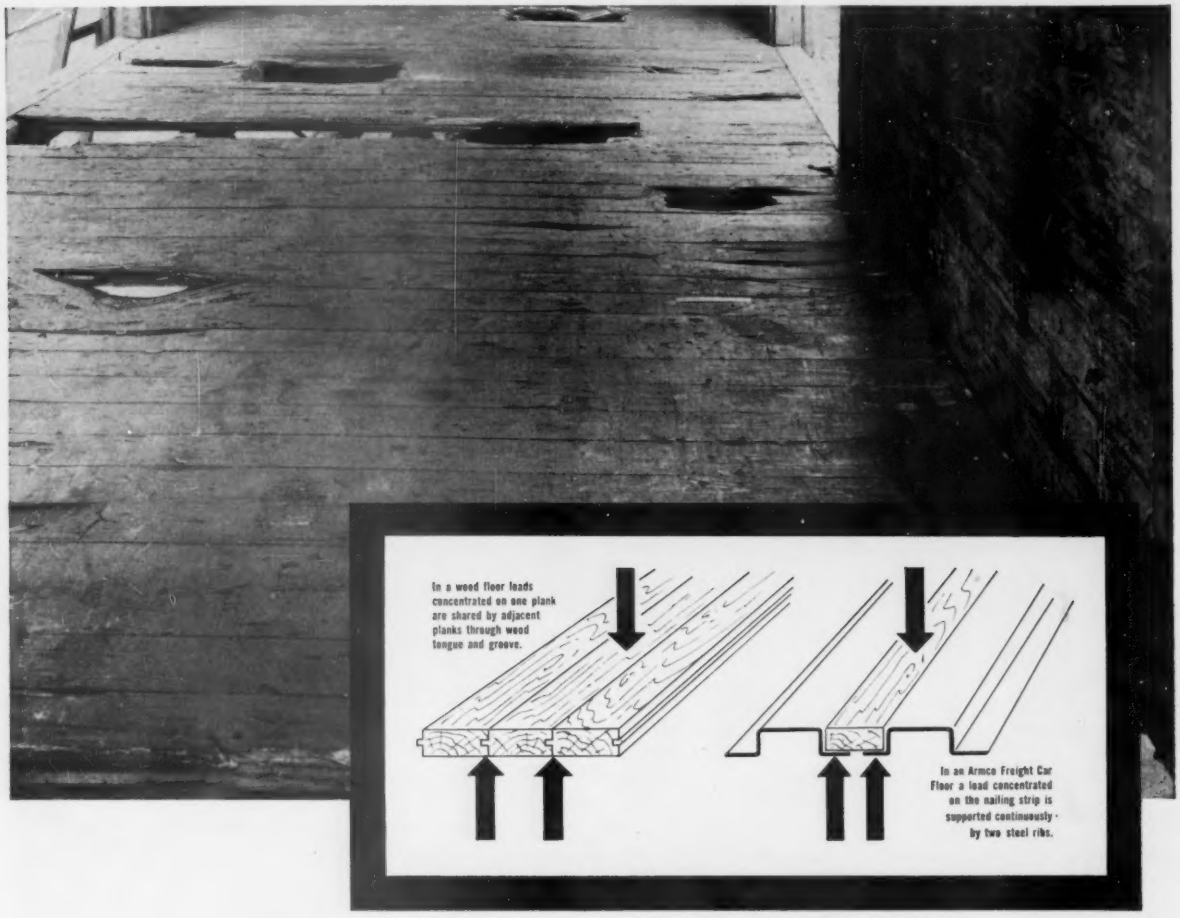
1. Effective detergent action prevents harmful piston ring deposits.
2. Selected base stocks insure against hard deposits on the piston crown and area above first ring.
3. 100% solvent refining insures greater stability and better bearing protection.

Call in a Gulf Sales Engineer and ask him to recommend the proper grade of this quality lubricant to improve lubrication and reduce maintenance costs for your Diesel locomotives. Contact him at your nearest Gulf office, today.

GULF OIL CORPORATION · GULF REFINING COMPANY

1822 GULF BUILDING, PITTSBURGH 30, PENNSYLVANIA

GULF



Armco Car Flooring won't let this happen!

In Armco Freight Car Flooring, stout hat-section steel ribs take the load and support heavy wood nailing strips. That's why, even without extra stringer support, Armco Freight Car Flooring resists the heavy concentrated loads of lift trucks that often break through conventional car flooring. Besides, the ribs are welded to the car underframe and reinforce it.

For Gondola and Flat Cars, too

Armco Freight Car Flooring is made for gondola, box and flat cars. It is designed both for new construction and for replacement of worn-out wood or steel-plate floors in existing cars.

A Multi-Purpose Floor

The Armco floor will handle bulk- or unit-lading equally well. This eliminates the problem of selecting a car by floor type. It saves time and money for both the railroad and the shipper in switching empty cars. This is of special importance in the case of gondola cars. The same car that brings bulk loads into a plant can carry away the manufactured product.

Armco Freight Car Flooring is made for fastening bracing and skids in the proper way—with nails. There's no invitation to weld fasteners to plate floors or burn holes for bolts.

Send for Booklet

There's a new booklet about "Armco Freight Car Flooring." We'll send you a copy if you'll fill out the coupon below and mail it to us.

ARMCO STEEL CORPORATION
1804 Curtis Street • Middletown, Ohio

Send me a copy of the booklet, "Armco Freight Car Flooring."

Name_____

Position_____

Railroad_____

Street_____

City_____ Zone____ State_____

ARMCO STEEL CORPORATION

1804 Curtis Street, Middletown, Ohio

Export: The Armco International Corporation

ARMCO

NEW

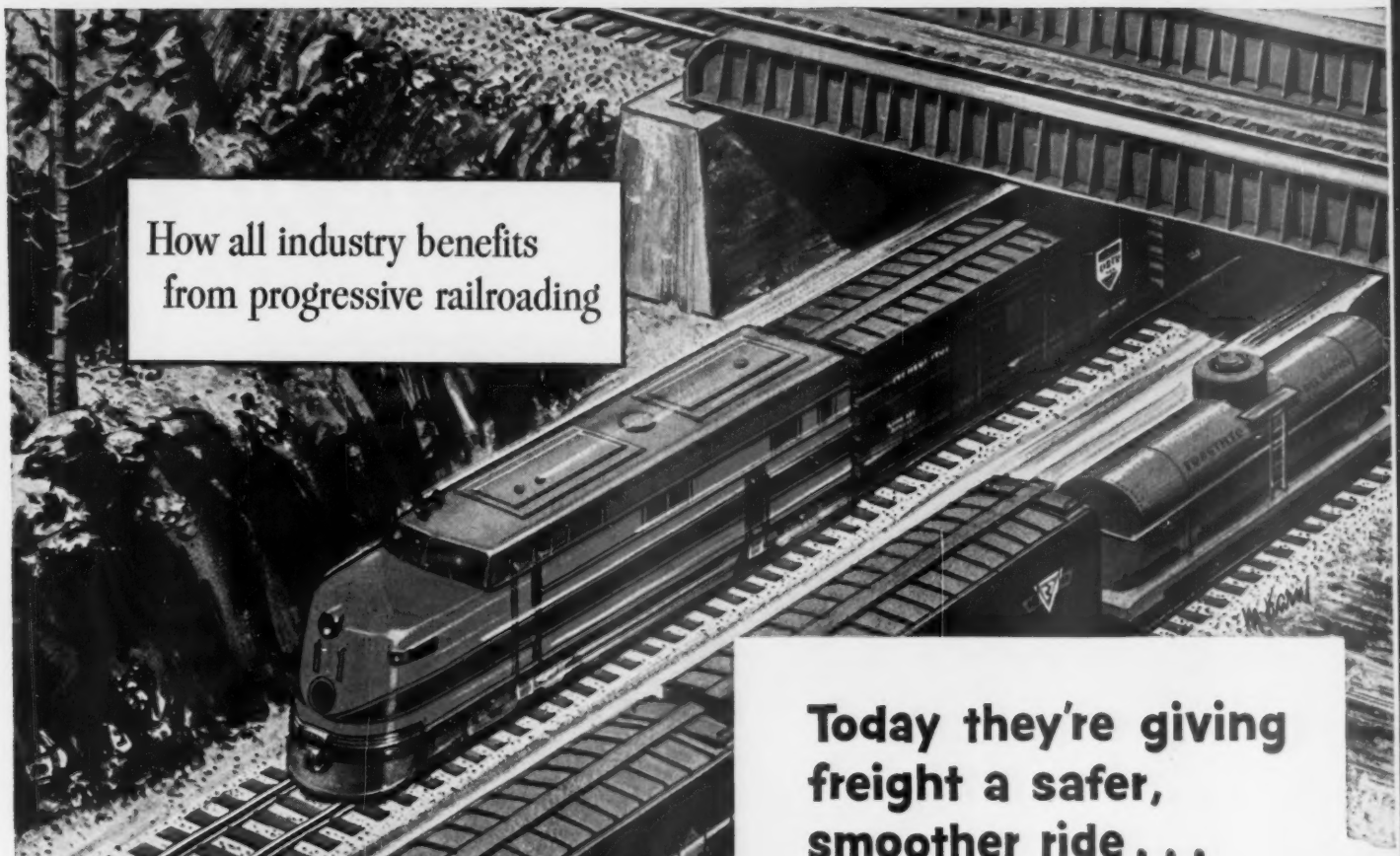
CLASS RF-333
DRAFT GEAR

The advertisement at right is the first in a series currently running in national business magazines.

We sponsor it in the belief that such a series will help make industry more aware of the outstanding record of railroad progress and achievement.

AMERICAN STEEL FOUNDRIES

410 N. Michigan Ave., Chicago 11, Ill.



How all industry benefits from progressive railroading

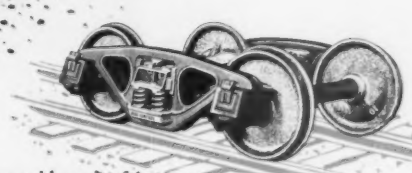
Today they're giving freight a safer, smoother ride . . .

In a persistent effort to make good service even better, railroads have turned the spotlight on the causes and cures of lading damage. Lest someone get the impression that freight shipments are risky, here are some facts about an unusual record of achievement.

First, the number of claims has gone steadily down; total in 1952 was 39% less than five years ago. In terms of dollars, current loss is *less than one-fiftieth of one cent for each mile a ton is carried.*

The irreducible minimum hasn't been reached yet, of course. Railroads are working with shippers on better loading methods. They're developing impact-free classification systems; investing in better cars that ride smoothly at high speeds. For example, the modern Ride-Control® Truck, developed by American Steel Foundries, rides up to *fifty times more smoothly* than the ordinary trucks of ten years ago!

But, over-all railroad progress is not traceable to any isolated development or to any single railroad. Continuous improvements, jointly made by railroads and suppliers alike, are making today's freight service better . . . and a bigger value than ever before.

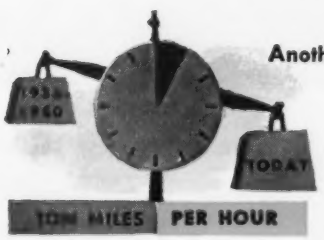


Freight is hauled smoothly and safely on the modern Ride-Control Truck. This truck was the first to permit passenger-train speeds for freight trains . . . *at freight train costs.*

American Steel Foundries

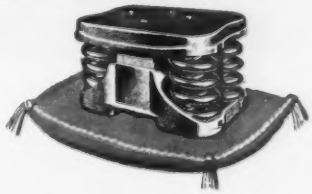
World's largest producers of railroad running gear

Executive Offices: Wrigley Building, Chicago 11



Another plus of modern railroading

Industry benefits from the efficiency of today's modern car pool. Average ton-miles hauled per train hour shot up 74% from the 1936-1940 period!



Mechanical principles of the Ride-Control Truck are now built into the "Ride-Control Package"—which economically makes older cars suitable for high speeds, unrestricted use.

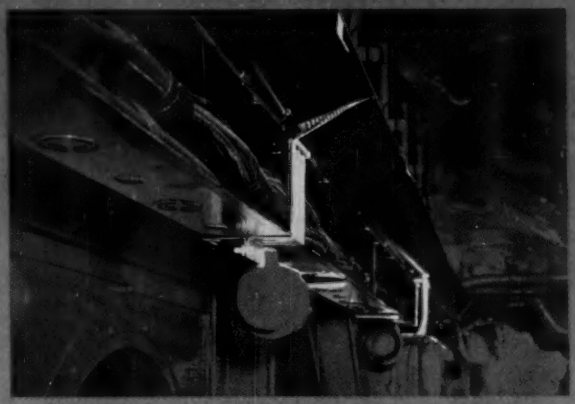
Diesel operation

Since B&O's first freight diesels went into operation in 1942, they have learned that wiring *accessibility* is vitally important to efficient diesel operation.

Today, in modernizing their ten-year-old diesels, they are eliminating those old, original wiring "mare's nests"—the miles of conduit which used to stretch along the walls, overhead, under the floors. That costly and inconvenient system is now a thing of the past.

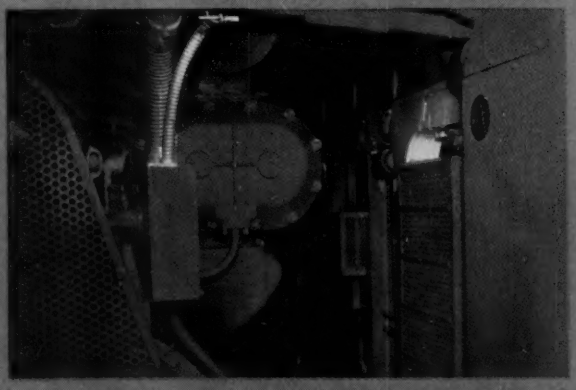
National Electric 4" x 4" Wirewā, Flexsteel and metal raceways now effect substantial savings. But even better, all electrical circuits in B&O modernized diesels are completely accessible for *immediate* repairs, tap-offs or additions.

Write for the new Railroad catalog



NATIONAL ELECTRIC 4" x 4" WIREWĀ (with lids open to show accessibility) carrying up to 50 wires. Wires shown here provide control circuits for terminal lighting, engine speed, air-compression, temperature, lighting, alarm, signal and dynamic braking control circuits.

WIREWĀ IN BOOSTER UNIT with Tee connection leading to high-voltage cabinet replaced inaccessible maze of conduits originally strung along wall. Note light in bottom knockout of Wirewā, providing illumination where most needed.



NATIONAL ELECTRIC FLEXIBLE CONDUIT carries starting leads of high voltages up to 1000 volts. Smaller conduit carries leads for battery field excitation. Wirewā Tee houses tractor motor shunting resistors.

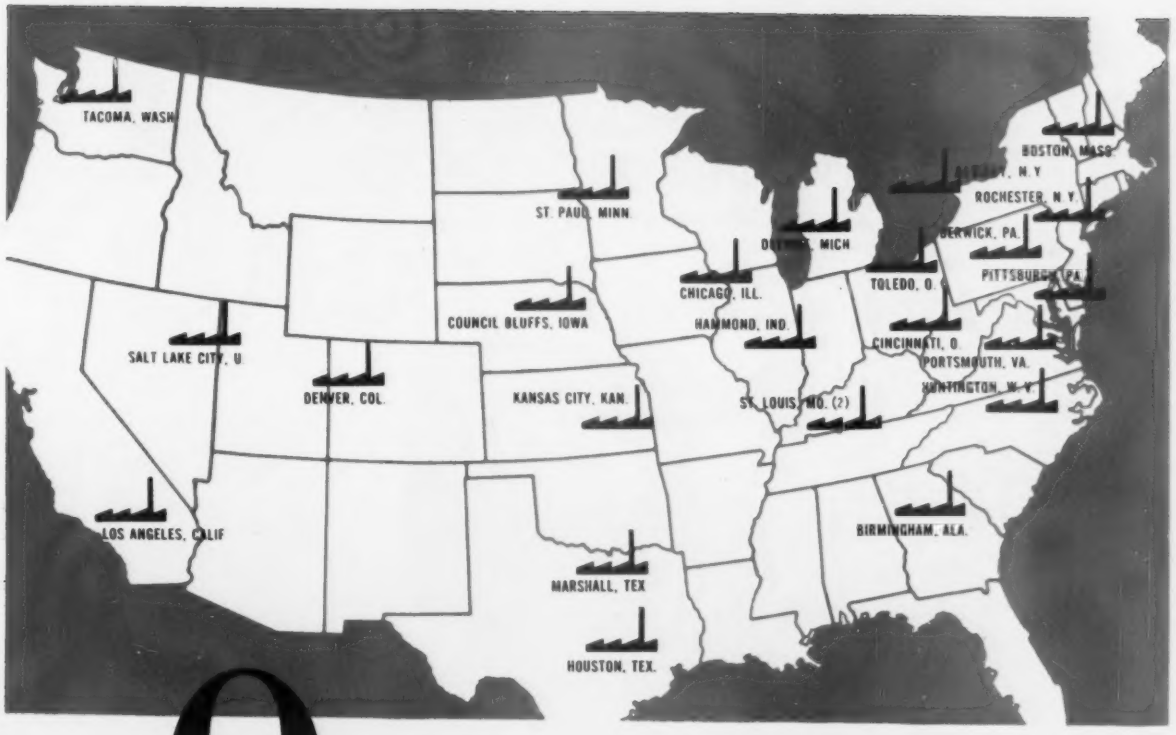
WIREWĀ CROSS-OVER of leads and two terminal boxes in booster unit where various control circuits terminate. From terminal boxes 21 control circuits can be connected to any unit coupled to the engine.

EVERYTHING IN WIRING FOR THE RAILROADS

National Electric Products

PITTSBURGH, PA.

3 Plants . 8 Warehouses . 34 Sales Offices



Quick low-cost delivery of chilled car wheels from the AMCCW plant near you

You can get chilled car wheels. You can get them promptly. What's more, you can get them from an AMCCW plant on or near your line, saving "foreign line" freight charges.

All this spells economy because it means lower inventory, smaller investment in stocks of new wheels.

All AMCCW plants produce the improved car wheel with more brackets to give thicker, heavier, more continuous flange support . . . and with a heavier tread on both rim and flange sides.

In good supply
Available locally
Short-haul delivery
Reduced inventory
Low first cost
Low exchange cost
Increased ton mileage
High safety standards
AMCCW plant inspection
Easier shop handling

Association of Manufacturers of Chilled Car Wheels

445 North Sacramento Boulevard, Chicago 12, Ill.

Albany Car Wheel Co. • American Car & Foundry Co.
Griffin Wheel Co. • Marshall Car Wheel & Foundry Co. • Pullman-Standard Car Mfg. Co.
Southern Wheel (American Brake Shoe Co.)

TAKING THE HEAT OFF....

Bower-Franklin journal boxes, equipped with dependable Bower straight roller bearings, are ready to help you carry more freight — at greater speeds — with no danger of hot boxes.

These high-quality bearings have already *proved* themselves in numerous other types of heavy-duty equipment — steel rolling mills, heavy trucks, earthmovers, cranes, shovels, and railroad generator-drive units, to mention but a few.

Sales and application engineering for the Bower-Franklin journal boxes are being handled by the Franklin Balmar Corporation. Additional information will be furnished on request.

FRANKLIN BALMAR CORPORATION

FRANKLIN BALMAR CORPORATION
WOODBERRY, BALTIMORE 11, MARYLAND
CHICAGO OFFICE: 5001 North Wolcott Ave., Chicago 40

5 REASONS WHY IT PAYS TO SPECIFY ALCOLID® the lifetime journal box lid

1. OVERALL RUGGEDNESS!
lid body is of 5/32" full section steel; hood 3/16" and strap 7/32" steel

2. SOLID IN DESIGN—ONLY TWO PARTS!
a heavy steel lid and a square-headed retaining pin that's non-rotating—won't elongate pin holes

3. CLOSES TIGHT—NO VIBRATION!
sturdy torsion spring exerts constant 50-lb. pressure for permanent locking

4. OPENS EASILY!
roller is mounted on the spring to give smooth roller-bearing action—even after years of use

5. INSTALLED IN A MINUTE!
three simple steps and it's ready to operate—for a lifetime!

Your Alco sales representative will be glad to give you full information.

ALCOLID

RAILWAY STEEL-SPRING DIVISION
AMERICAN LOCOMOTIVE COMPANY

New York • Richmond • Cleveland • Chicago • St. Louis • St. Paul • San Francisco

One type of General Electric cable is used for the traction motor leads shown here, as well as for other power circuits, and, in smaller sizes and lower voltage rating, for control circuits.

You need just one type of G-E cable

for your diesel-electric locomotive rewiring program

One type of G-E diesel-electric locomotive cable can be used *size for size* to replace the worn-out general-purpose wiring in any locomotive. This cable is General Electric Versatol* Geoprene. It is available in sizes No. 14 Awg and larger with a 1000-volt rating for power circuits, and in sizes No. 16 and 14 Awg with a 300-volt rating for control circuits. The rating of the control cable is printed on the insulation for easy identification.

Versatol Geoprene cable has the toughness needed for power circuits

The neoprene-base jacket protects against flying dust, grit, and sand. It resists oils, water, cleaning compounds, live steam, and ice. The extra-flexible rope stranding is designed to withstand continual flexing. The insulation has excellent heat and moisture resistance to withstand severe operating conditions.

Versatol Geoprene has the easy-handling properties needed for control circuits

Fine stranding makes this cable flexible and easy to pull. The insulation strips cleanly for easy application of terminals. Uniform diameters simplify installation.

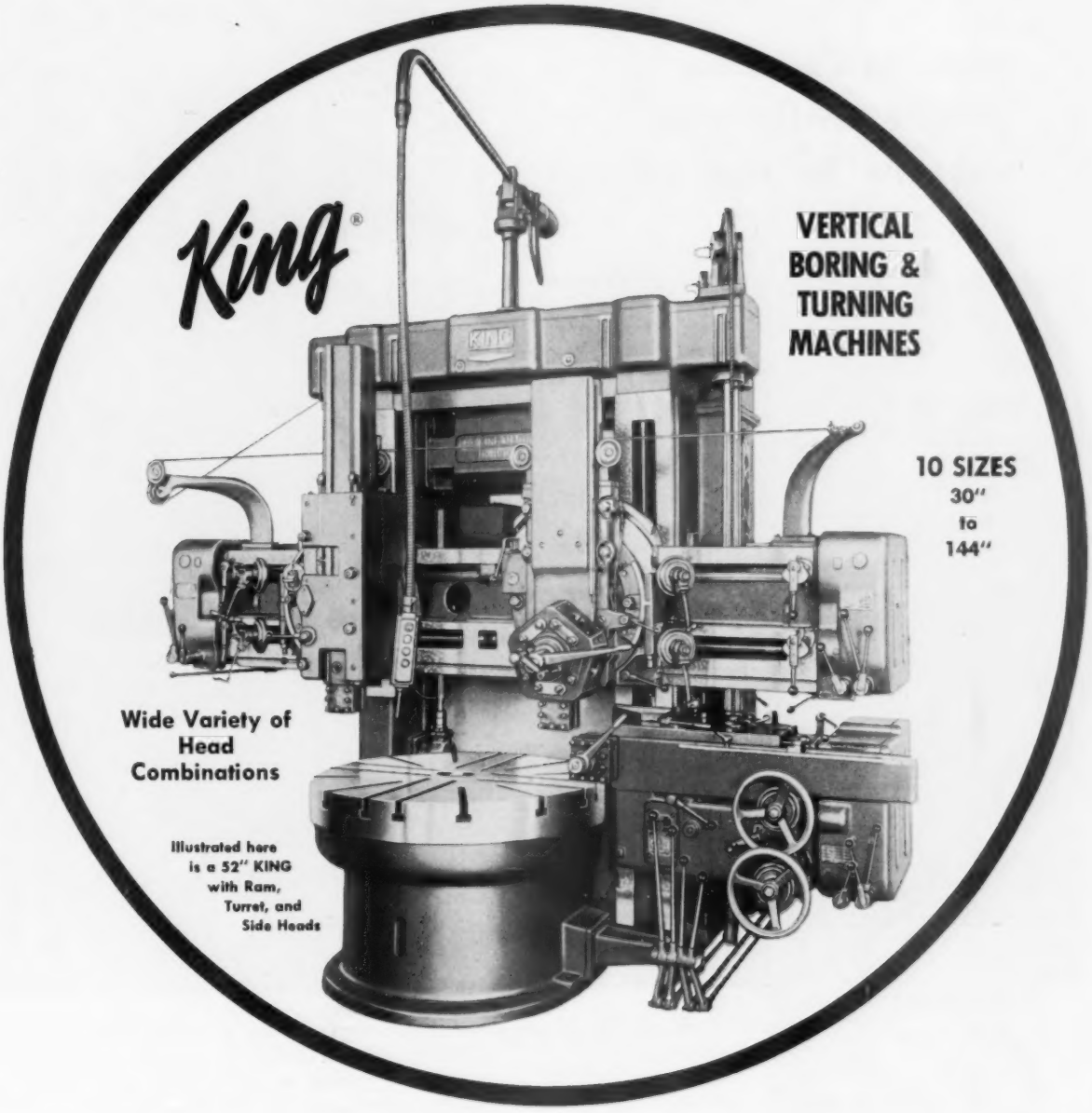
Simplify your stocking problems

Use this one type of G-E cable for all general-purpose rewiring. Special high-temperature cables are available for use in high heat areas. For more information, write Section W118-347, Construction Materials Division, General Electric Company, Bridgeport 2, Connecticut.

*Registered Trade-mark General Electric Company

You can put your confidence in—

GENERAL ELECTRIC

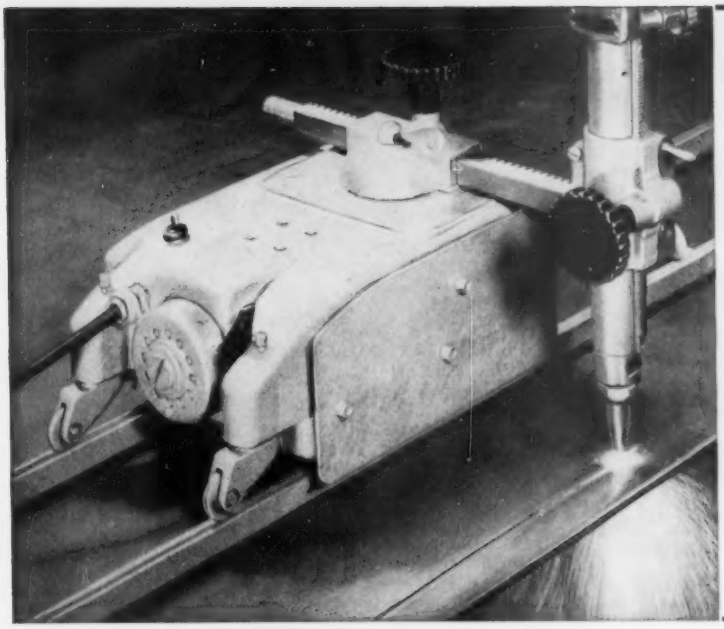


KING is recognized, today as for half a century past, as the *best* vertical boring and turning machine for all-around maintenance work in the railway shops of America.

American Steel Foundries

KING MACHINE TOOL DIVISION

1150 TENNESSEE AVENUE — CINCINNATI 29, OHIO



Specifications
For the Many-Purpose
OXWELD CM-45 Machine Carriage

Overall length	13⅜ in.
Overall width	7⅛ in.
Height to top of machine	4½ in.
Weight, equipped with blowpipe (illustrated)	33¼ lbs.
Speed Range	4 to 32 in. per min.
Circle-cutting diameters	2 to 54 in.
Motor	115-volt, 60-cycle A.C.

Do All These Jobs with the OXWELD CM-45

Trade-Mark

Plate-Edge Preparation **Bevel-Cutting** **Automatic Welding**
Circle-Cutting **Straight-line Cutting** **Flame-Hardening**

Here's the low-cost portable machine carriage you have been looking for! You'll get more speed, flexibility, efficiency, and economy in a wider variety of metal-cutting, flame-treating, and mechanized welding jobs. The lightweight, labor-saving OXWELD CM-45 machine handles practically all machine-carriage requirements found in railroad shops, and supplements the heavier equipment used for bigger jobs.

For further information, ask for form 7839. Fill in and mail the coupon at right to Oxweld Railroad Service Company, a Division of Union Carbide and Carbon Corporation, 230 N. Michigan Ave., Chicago 1, Ill.

The term OXWELD is a registered trade-mark of Union Carbide and Carbon Corporation.

Oxweld Railroad Service Company
Room 1320
230 North Michigan Ave.
Chicago 1, Ill.

Please send me, free of charge, a copy of Form 7839.

Name.....

Street.....

City.....Zone....State.....

(Please Type or Print Your Name and Address)

ELECTRICAL INSULATION IS OUR SPECIALTY

Q. *What ONE wire and cable producer grows its own natural rubber, and makes its own synthetic rubber?*

A. UNITED STATES RUBBER COMPANY.

Q. *What ONE wire and cable producer makes plastics?*

A. "U. S."

Q. *What is the most important part of wire and cable?*

A. The insulation.

Q. *Who is best equipped to make wire and cable with superior insulation?*

A. U. S. RUBBER—which grows its own natural rubber, makes its own synthetic rubber, manufactures its own plastics.

Tapping rubber from one of the millions of trees on U. S. Rubber's giant plantations in Malaya.

Isn't it logical that a rubber company should make the best wire and cable insulation there is? U. S. Rubber has been a pioneer in insulation for over 70 years—has amassed in that time a stockpile of research data and experience that can't be beat. Electrical insulation is a "U. S." specialty!

Electrical insulation makes the difference between superior and ordinary wire and cable. Conductors of all manufacturers are standard, but insulation must be the best that science can produce. That's why your best bet in wire and cable is U. S. Rubber.

SOME MORE OF THE MANY DIFFERENT VARIETIES OF "U. S." WIRE AND CABLE

RAILROADS: Power Cables • Communications • Railway Signal • Royal Cords • Welding Cable • Railway Utility • Sup. Control • Weatherproof

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OZONE
Absolute Tops in MOISTURE Resistance
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U. S. RUBBER'S BUTYL-INSULATED POWER CABLES

America's railroads depend on this cable for steady power distribution and for general-purpose wiring on circuits up to 8000 volts between phases and at conductor temperatures up to 80 C. The insulation will not crack after four hours in air containing 0.015 per cent ozone. Light in weight, easy to install and join, resistant to oil, heat, sunlight, flame, acids, alkalies and corrosive chemicals. The following are guaranteed test values:

PHYSICAL AND AGING PROPERTIES (MINIMUM VALUES)

	Butyl Insulation			Neoprene Jacket	
	Unaged	After 168 Hrs. in O.B. at 80 C.	After 7 days in Air Oven at 250 F.	Unaged	After 96 Hrs. in O.B. at 70 C.
Tensile, lbs. per sq. in.	600	500	400	1800	1600
Elongation, per cent	400	350	350	300	250

MOISTURE RESISTANCE (MAXIMUM VALUES)

a. Dielectric constant and power factor of insulation after immersion in water at 50 C.

Dielectric constant, one day	4.0
Per cent gain, 1 to 14 days	2.0
Per cent gain, 7 to 14 days	1.0
Power factor, one day, per cent	2.0

b. Mgs. per sq. in., 7 days at 70 C. 15.0

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AMAZING

V-B VAPOR BLAST *Liquid Honing*

cuts Diesel Engine overhaul time to FRACTIONS

Here's a great time and labor saver for your overhaul and cleaning operations! It's VAPOR BLAST* LIQUID HONING,* a process that is eliminating solvent soaking, laborious hand cleaning — does the job faster, better, without loss of micro-inch dimensions. According to users, VAPOR BLAST* actually *improves* the Diesel performance and *increases operation time between overhauls.*

some typical PROVEN advantages:

• "DOWN-TIME" reduced by HOURS! Rolling stock returned to service SOONER because of time savings possible with VAPOR BLAST* Liquid Honing.*

• 92% REDUCTION in Diesel Maintenance Shop Costs! Diesels cleaned and maintained by Vapor Blast process, operate like new, at savings of up to 92.7% over previous methods.

• 14 Hours Cut to 2 Hours 17 Minutes! One large user of Diesel Motors says: "With Vapor Blast* Liquid Honing,* we clean 6 Diesel pistons and 6 sleeves in 2 hours, 17 minutes. This operation took 14 hours before we installed Vapor Blast Machines."

VAPOR BLAST
Model 3030, Type B20

One of five standard, self-contained models, available for your specific needs. Custom Machines also built to order.

Don't take our word...prove it yourself!

Just send us one of your most time-consuming finishing or cleaning jobs. We'll finish it to your specifications — and give you a detailed report on how it was Vapor Blasted, what abrasive was used, how long it took. Then compare it with your own production time. There's no obligation.

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Walworth manufactures a complete line of Gate, Globe, Angle, Check, and Lubricated Plug Valves, made of Stainless Steel, Steel, Iron, Bronze, and Special Alloys in a wide range of sizes and temperature-pressure ratings.

Fittings of steel, iron, and bronze are also manufactured in all conventional types and sizes.

Walworth has been manufacturing AAR Bronze Valves and AAR Malleable Iron Fittings, AAR Malleable Iron Unions and Union Fittings since the standards were established.

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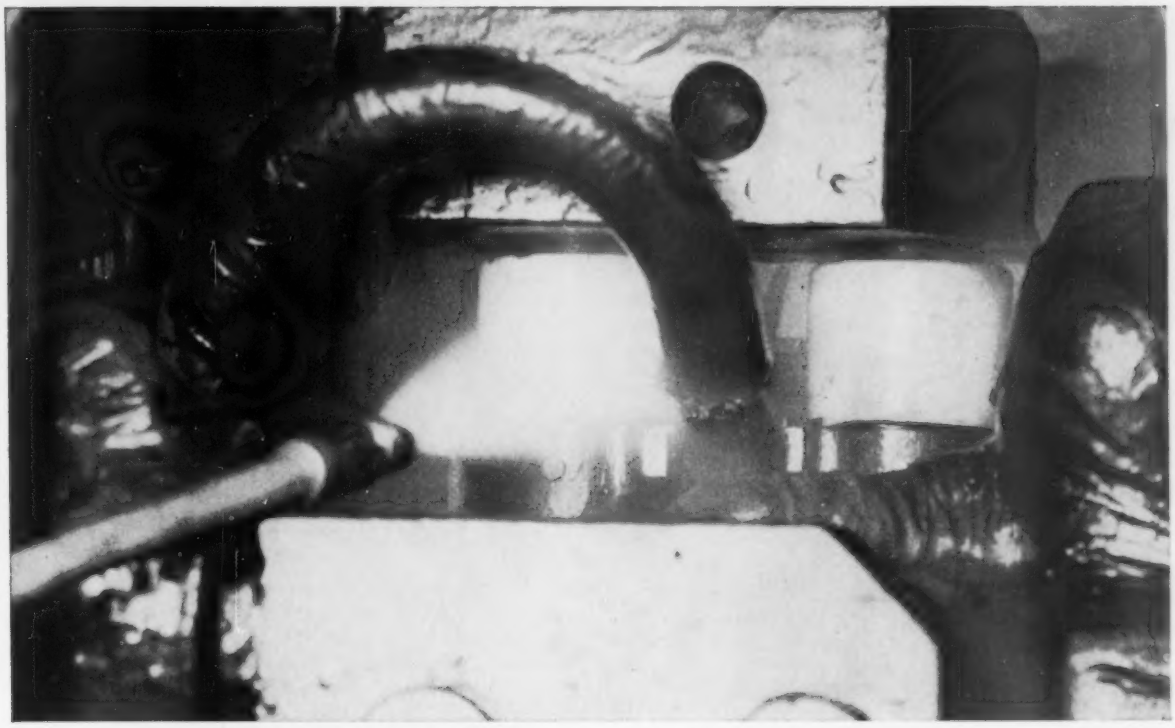
60 East 42nd St., New York 17, N. Y.

Distributors in principal centers throughout the world

EPC 401 removes electrically conducting soil WITHOUT WIPING!



Removing carbon deposits from insulators on a main line diesel traction motor with Yosemite EPC 401.

Electrically conducting soil accumulation is one of the primary causes of traction motor and main generator failure.

Electrically conducting soil is made up of carbon dust particles that are bound to a surface by intermolecular forces, and by oil and grease that are more or less hardened by heat.

As soil collects behind risers and creepage surfaces, or at the brush-commutator point of contact, arcing can and does occur.

There are several solvents that will dissolve the oil and grease binder. But they leave the carbon dust which continues to harden and build up. In some cases carbon can be removed by hand wiping. On inaccessible surfaces, however, it remains until equipment is dismantled.

Now, with Yosemite EPC 401—the newest advancement in electrical parts cleaners, you can remove electrically conducting soil from electrical equipment without hand wiping.

Field tests show that EPC 401 effectively penetrates carbon deposits, diminishing the cohesion between particles and their adhesion to metal or varnish surfaces.

The gummy binder of oil and grease is quickly dissolved, and the loosened carbon is dispersed and carried away by the EPC 401.

As concerns safety: The Maximum Allowable Concentration rating of EPC 401 vapor in air is of the same order as Stoddard Solvent. It has a mild, non-irritating odor.

EPC 401 has no initial flash point. Its evaporation rate is not so fast as to lead to moisture condensation, or to redeposition of soil—nor so slow as to appreciably lengthen drying time. EPC 401 leaves no residue.

For specific information on EPC 401, write Yosemite Chemical Co., Railroad Division, 1040 Mariposa St., San Francisco 7, California.

Yosemite CHEMICAL COMPANY

SAN FRANCISCO
LOS ANGELES
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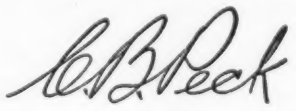
The Fall Conventions

At present there seems to be some uncertainty as to whether the fall meetings of the Coordinated Mechanical Associations and the exhibit of the Allied Railway Supply Association, scheduled for September 13 to 15, will actually be held. This matter will have to be settled within the next few weeks.

What are the functions of these associations in the scheme of railway operation? Are they to be tolerated in fair weather, but dispensed with at the first sign of a cloud on the horizon, or do they best serve the railways when the going is tough and the ingenuity of every supervisor is taxed to the limit to keep his end up?

The programs of the Coordinated Associations deal with the down-to-earth problems with which their member supervisors are faced every day on their jobs. The programs also include one or more addresses presented by officers whose words reflect a wealth of experience and genrally are forward looking. Their effect is inspirational and broadening to the outlook of supervisors, whose success depends upon their ingenuity in meeting crises and upon their ability to mold their men into smoothly functioning teams. The feeling of "belonging" which develops from the exchange of experience on the convention floor and in personal contacts outside the meeting rooms is an invaluable morale booster. Supervisors, by and large, get little help from any other source in the refinement of their technique as supervisors, and in the discharge of their responsibilities for keeping locomotives and cars running when help is short and materials none too abundant.

The benefits of association work culminate in the annual meetings. The value of these meetings to their members and, through them, to the railroads is not questioned when railway traffic is expanding. Who is to say that they are not even more valuable when traffic is declining? Then is when the stream of new ideas for better methods needs to be kept unclogged and when morale is most severely strained. Plans of the Coordinated group for the fall meetings are already well advanced. Mechanical-department officers can serve their railroads well by encouraging the group to complete them and carry them through.



EDITORIALS

How To Detect Copper Penetration

No statistics are available regarding the number of car journals which failed on American railroads during 1953, due to copper penetration, or how much these failures cost in damage to equipment and lading, not to mention personal injuries and fatalities. This type of journal defect is not new, in fact, has been known for many years, but recent experiences on individual roads have focused attention on it again and seem to justify extensive general effort to develop and utilize the most effective means of detection.

Copper penetration is not really a primary cause of journal failures, because it occurs only as a result of other conditions, shown by laboratory tests to include high temperature due to excessive friction, reversal of stress and the presence of non-ferrous alloys in the liquid state induced by heat. Unfortunately, these are exactly the conditions present in so many instances of hot boxes which are now delaying freight trains, increasing railway costs, interfering with service and hence engaging the critical attention of railway managements.

It is estimated that 90 per cent of the car journals that are broken off while overheated are due to non-ferrous metal penetration of the steel and can be caused by a single heating at the time of the failure. The prevention of this form of journal failure seems possible only by one means and that is to eliminate the conditions which led to the original overheating.

When failures do not occur immediately, however, axles with journal defects of this type generally get back in the wheel shop and, without critical inspection, may have the journals turned down, burnished and returned to service where they present a grave hazard. It seems clear that railroads are justified in whatever expenditures for equipment and labor are necessary to find these defective axles in wheel shops and make sure they are taken out of service.

There are several reliable methods of inspecting car journals for copper penetration and other defects and the unwillingness of any railroad to avail itself of these modern facilities which have definitely proved their ability to cut down the number of axle failures on the road by the simple process of detecting potential defects in the shop is just gambling with the chance of a disastrous and expensive wreck.

An Old Idea That Might Save Money

For many years the average motorist has relied upon the periodic application of a coat of wax to help preserve the finish of his automobile. The practice has not, however, become popular on either motive power or car exteriors. Perhaps it is time to evaluate the possibilities on some selected items of equipment, probably diesel road locomotives and passenger cars, in order to determine the most economical finishing practices.

The first consideration would—as always—be relative cost. Would waxing pay? Would the life of the paint job be extended sufficiently to justify the expense of however many times a year a car or locomotive would have to be waxed to protect its finish? It is of course one thing for an automobile owner to spend two to eight hours several times a year waxing his car—he does not compute the value of the time he spends on the job. If he did, he might find that it would be cheaper to forget all about trying to preserve the original finish, and instead have his car repainted every few years if he kept it that long. A good part of his reason for washing and waxing is the personal pride he takes in having a shiny good looking auto.

It is, therefore, quite another thing for the railroad to assess the value of waxing its diesels or passenger cars; the labor has to be paid for in its case, and the cost of the wax, instead of being a dollar or two a year, would

be a considerable expenditure if widely used. There would also be the question of what type wax to use—paste, liquid or spray, in increasing order of price but decreasing order of probable cost of application.

Inasmuch as nobody we've talked to has any idea what the costs would be to wax a diesel or a passenger car, or any idea of what the potential advantages might be, there is only one way to find out. Make a test. A simple inexpensive way, and one that would give most of the answers at least, would be to take a pair of freshly painted A-units that are to operate together, keep one well waxed and the other not at all. See how much longer it took before the waxed unit needed repainting, add up the costs, and you would have a rough idea at least of whether the idea is worth anything.

One other thing that should not of course be overlooked is that any preliminary small-scale test of the merits of waxing would be done by hand, whereas the adoption of waxing as a regular routine on a wide basis would no doubt lead to the development of mechanical methods for doing the job, and a consequent reduction in the cost of doing it.

RESPONSIBILITY—DIVIDED FOUR WAYS

It was only a few years ago that flashovers of diesel locomotive motors and generators began to cause enough trouble to require serious attention. As speeds increased and more power was packed into locomotive units, the frequency of flashovers increased. Of course, during the same time, the number of locomotives increased, and this in turn multiplied the total number of flashovers that had to be accounted for.

Three years ago, the Locomotive Maintenance Officers Association began a study of flashovers. They approached the subject respectfully, admitting they were starting from scratch. Since then they have developed much practical information and this was assembled and presented at their meeting in September 1953, in Chicago. A summation of their findings was made by W. P. Miller, Chicago & North Western as a part of a symposium of papers on flashovers presented before electrical engineers in New York, on January 24, 1954. At this same meeting, J. R. Schoonover, of the Lehigh Valley, showed how wheel-slip-slide devices can reduce the incidence of flashovers, O. C. Coho, General Electric Company, showed high-speed color motion pictures of actual flashovers, and C. A. Atwell, Westinghouse Electric Corporation, presented a paper on the subject which is summarized elsewhere in this issue.

One thing was made particularly clear by this consideration of the subject. Those responsible for flashovers include the designer, the manufacturer, the operator and the maintainer. It is a case of responsibility divided four ways.

Removal of most of the causes of flashovers will require a lot of practical Christianity. It is easy for any one of the designer-manufacturer-operator-maintainer quartette to blame the others for sour notes, but that won't make music. Only when each one decides that it is his responsibility to do the best he can, will there be harmony, and flashovers be brought down to an irreducible minimum.

NEW BOOKS

STRESS CONCENTRATION DESIGN FACTORS. *By R. E. Peterson.* Book consists of charts and relations for making strength calculation for machine parts and structural elements. Mr. Peterson has been manager of the mechanics department of the Westinghouse Electric Corporation research laboratories since 1931. He has worked with engineers from many fields—automotive, aircraft and railway—in devising corrective measures, and is the author of many technical papers.

A working tool for designers, the book deals with improvement of design calculations which result in better-balanced plans and fewer operating failures. Mr. Peterson supplements graphic presentation with explanatory notes, covering definition and design relations, grooves and notches, shoulder fillets, holes in plates or shafts and miscellaneous design elements. Aids to the reader include a clear thumb-index, wire-ring binding and 8 in. by 10 in. full-grid charts. Appendices provide information on stress relations for member with single groove or notch, application of the Mohr theory for fatigue of brittle materials, derivation of relation for limited number of cycles and derivation of combined stress relations.

John Wiley & Sons, Inc., New York. Price, $8.50.

RAILROAD ENGINEERING, *by William W. Hay.* Volume 1 of this book presents a compact picture of railroad construction and maintenance practices and shows the present stage of development in railroad engineering research. Part 1 of the volume, Principles of Location and Operation of a Railroad, discusses the nature of railroad traffic, costs of traffic in relation to operating expenses, location, curvature, tonnage ratings, gradients, etc. The steam locomotive and electric locomotive types and equipment, which have had attendant repercussions on the design of railway location and plant, are also discussed. Part 2 concerns the principles of maintenance and construction of the railroad right-of-way.

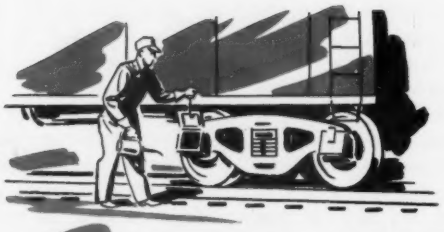
John Wiley & Sons, Inc., New York. Price, $7.50.

Some interesting *facts* about

FREIGHT CAR SERVICING

and

LOW-COST SOLID BEARINGS



How much time is given to train inspections . . . to what extent journal bearings are involved . . . what the present cost is—in man-hours and materials . . . and how better maintenance and available developments can further improve efficiency

FREIGHT CARS spend about 9 hours a day in yard movements—interchange between roads, classification, and switching to loading and unloading tracks. But according to reliable information the average train is held only 30 minutes or less for car servicing and inspection. *That's less than 6% of the yard moving time—and far less of the total time in movement or subject to movement.*

You couldn't eliminate this inspection—even if bearings were no concern at all. It includes too much other equipment—brake hoses and rigging, wheels, couplers, air valves, door seals, and many other items in addition to journal bearings. It takes an appreciable amount of time just to walk the cut of cars. So even though it takes some man-hours to inspect the bearings, chances are in the vast majority of cases this bearing inspection affects departure times scarcely at all . . . certainly hardly any more than would be the case with any other type of bearing.

What do these man-hours cost? Well, based on the number of packers and oilers required by one railroad, whose miles per hot box for 1952 was 3 times better than the national average, the annual cost per car owned for this labor is only about 3% of the cost of installing expensive non-standard bearings. That includes the labor for repacks, too. In fact, total cost per car owned per year for all labor *and materials* needed for routine solid bearing maintenance comes to less than the annual interest and depreciation on the huge investment necessary for non-standard bearings. So, when you take the high costs of periodic disassembly and inspection of non-standard bearings into consideration, it's obvious that solid bearings are by far the better buy.

How to Lick Hot Boxes and Cut Inspection Time

You can lick hot boxes best with low-cost solid bearing designs. Here are just three available improvements—each designed to increase bearing mileage and each adaptable to existing equipment:

1. ***Low-cost heat resistant Satco lining metal***—Has a melting point 150° higher than standard babbitt, particularly advantageous in summer, but helpful all year round, too.

2. ***Twinplex Alarm Bearings***—Give smoke and odor indications should abnormal temperatures be reached, help detect failures before they become serious.

3. ***Magnus R-S Journal Stops and Packing Retainers***—Eliminate excessive axle displacement that causes waste grabs and spread linings. Keep the packing in place too—cut down man-hours for journal box servicing.

Combine these improvements with a program to upgrade maintenance standards and hot boxes will virtually disappear. And, of course, then you still retain all the inherent advantages of low-cost solid bearings.

Be sure to get your free copy of the "FACTS." Just write to Magnus Metal Corporation, 111 Broadway, New York 6; or 80 E. Jackson Blvd., Chicago 4.

MAGNUS

Solid Bearings

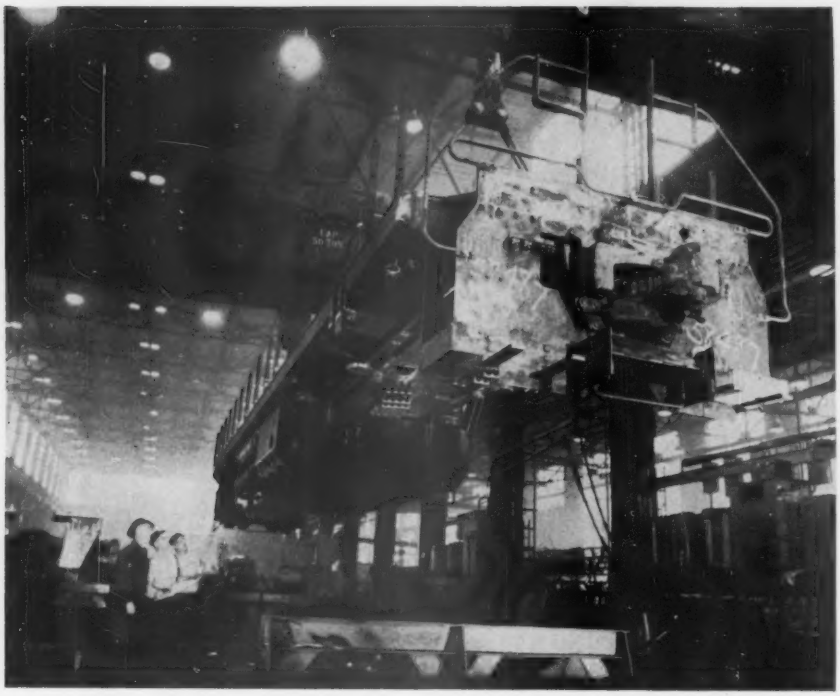
Right for Railroads
...in performance...in cost

MAGNUS METAL CORPORATION *Subsidiary of* **NATIONAL LEAD COMPANY**

Alco's DL-600 Designed For Three Classes of Service

Improved water-cooled turbosupercharging and increased capacity of electrical equipment permit high train loads in freight service and high speeds in passenger service.

THE American Locomotive Company has announced a new high-capacity diesel electric locomotive known as the Model DL-600, a six-motor unit powered with an improved version of the Model 244, 16-cylinder, V-type, 2,250 hp. Alco diesel engine. This new model, designed with minimum and maximum weights of 325,000 lb. and 390,000 lb. respectively, has a 65,100 lb. continuous tractive force rating when geared for top speed at 80 m.p.h. It has a high short-time (four minute) rating of 107,400 lb. and a starting tractive force of 97,500 lb. at 25 per



The underframe and the parts that are attached to the underside are assembled as a unit

cent adhesion. Some of the outstanding improvements are a new type water-cooled turbosupercharger, increased dynamic braking capacity, improved visibility, increased capacity in main generator enabling the traction motors to take full advantage of engine horsepower and simplified control circuits. The maximum pipe of the Model DL-600 is 14 ft. 8⅜ in., the maximum width is 10 ft. 1⅝ in. and the length inside coupler knuckles is 66 ft. 5 in. The locomotive has two 6-wheel, 3-motor trucks with 40-in. diameter wheels.

A hood-type unit, the DL-600 differs in outward appearance from Alco-built road switchers since its front and rear hoods are the same height as its cab.

The DL-600 has been designed to operate with the short nose forward to provide maximum visibility. Another distinction is the recess found in each of the four corners of the hood, which contains the 45-degree number boards, classification lights and sand box covers. Hand rails enclose the entire running board area, and the vestibule-type steps are designed so that a brakeman can operate either from them or from the locomotive's footboards.

This new heavy-duty all-purpose locomotive is a versatile unit built not only for high speed, main-line freight or passenger assignments but also for slow speed, heavy drag service. It is equally at home on medium speed local freight runs or yard transfer and switching assignments.

Power for the DL-600 is furnished by the improved Alco Model 244 Vee-type diesel engine. The 16-cylinder engine is rated at 2,250 hp. A new feature is the water-cooled turbosupercharging system which is designed to provide lower maintenance cost and more rugged construction than air-cooled superchargers formerly used with this engine. The new turbo offers improved acceleration characteristics due to its smaller diameter impeller, is relatively quiet in operation, and assures better engine combustion.

The locomotive is equipped with two three-motor, three-axle trucks of the drop equalizer, modified swivel type designed for ease of maintenance, equal weight distribution and smooth riding at high speeds.

For passenger service, the unit can be equipped with a steam generator of up to 4,500 pounds per hour capacity. Water capacity of 2,000 gallons assures long periods between refillings.

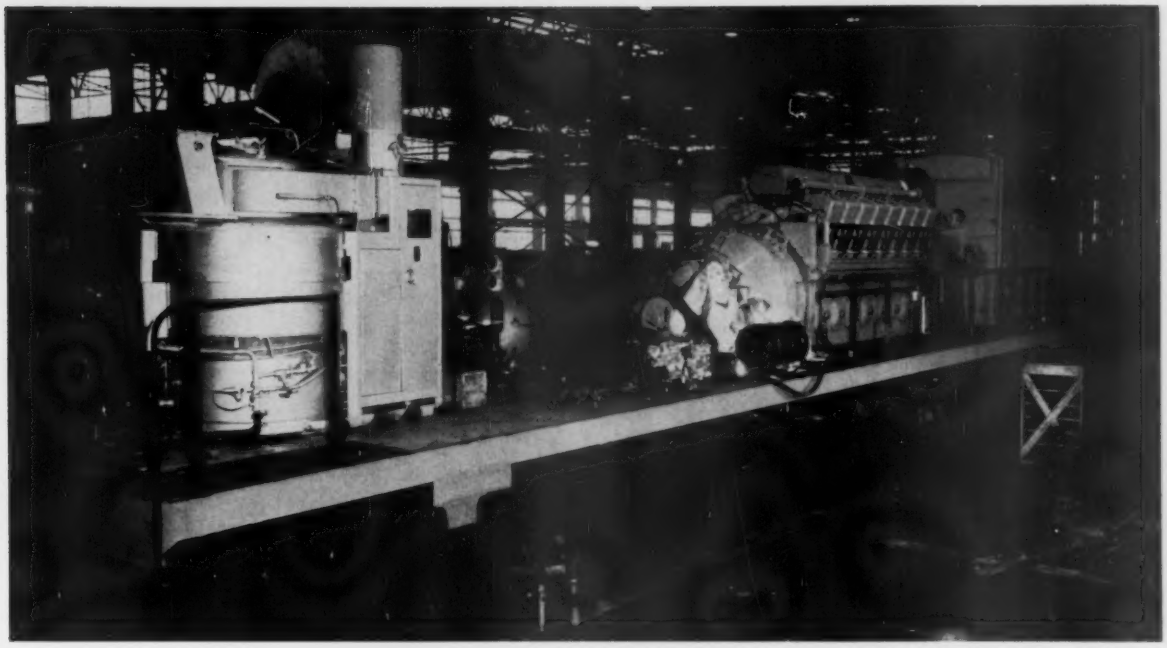
Liquid capacity is located on the underframe between the trucks, which eliminates the danger of weight transfer and provides for simple maintenance. Fuel capacity of 1,350 gallons insures long operating periods without refueling, and, if a steam generator is not required, a single fuel tank of 2,400 gallons capacity can be installed.

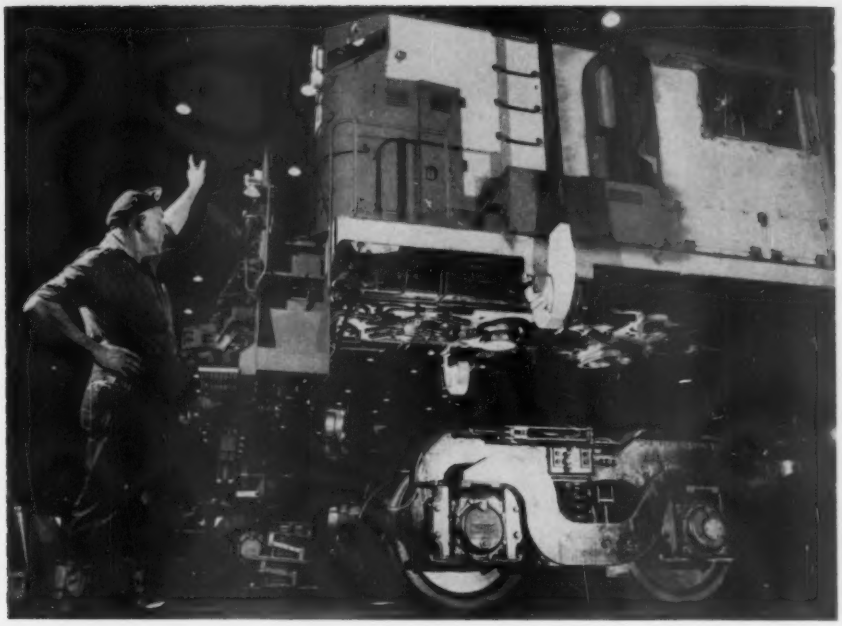
Increased Dynamic Braking Power

Alco's new locomotive is available with 3,400 dynamic brake horsepower at 20 m.p.h., the highest level yet offered on rail motive power, and fully automatic braking control can be added as a modification. Maximum dynamic braking forces range from 62,800 lb with 65-m.p.h. gearing to 51,500 lb. with 80-m.p.h. gearing. The rear hood has been raised to permit application of the high capacity dynamic braking over the engine.

Another feature of the DL-600 is the improved main generator, Model GT 586, which offers increased current capacity enabling traction motors to take full advantage of engine horsepower at all speeds. Short-time tractive force ratings can be reached which allow the development of tractive force up to values corresponding to 30 per cent adhesion.

The unit is equipped with GE-752 traction motors, the same powerful motors which are used on all Alco road locomotives. Traction motor connections are designed to give maximum utilization of the diesel engine over the entire speed range of the locomotive. They are two series, three parallel and six parallel, both with full and reduced field strength. Automatic transition is furnished.





Workmen installing the steam generator and Model 244 V-type diesel engine on the underframe. After the superstructure is completed it is lowered onto the trucks in the erecting shop

Main generator excitation current is supplied by a three-phase alternator and rectifier. The alternator feeds current into the rectifier for d.c. excitation. The system is designed for simplified maintenance, as the one a.c. generator replaces three rotating electrical machines.

Control circuits have been simplified by reducing the number of relays in the system, and the relays used are a new type designed to give longer life under service conditions. Both changes reduce control system maintenance.

The main generator is direct current and contains both main and starting windings. It is mounted directly on the end of the diesel engine, requiring only one generator armature bearing. The excitation alternator is mounted on the main generator, as is the auxiliary generator which supplies power for lighting, battery charging and control circuits. The auxiliary generator operates at constant voltage which is controlled by a voltage regulator. Both alternator and auxiliary are driven by gears connected to the main generator.

Air for traction motor cooling is supplied by two multivane traction motor blowers, each of which supplies air for the motors of one truck. The front blower is gear-driven off the main generator, while the rear blower is belt-driven from the shaft between the air compressor and the radiator fan.

Arrangement of long equalizers and deep deflection springs contributes to smooth riding at speeds up to 80 m.p.h. The spring system of the truck consists of four

The DL-600 is designed to operate with the short nose forward in order to obtain maximum visibility

groups of two helical springs each, located near each end pedestal. The truck frame is supported on these springs which in turn are carried on four sets of double, drop-center equalizers extending from the end axles to the center axle. Desired axle loadings are attained by proper positioning of springs along the spans of the equalizers and proper proportioning of the springs. Mechanical-type snubbers are applied in one spring of each group.

The center plate of the truck is located on a cross transom between two motors. The oil-lubricated loading-pad bearing surfaces are located similarly on the other transom at the opposite end of the truck. By placing the load-carrying members between the motors, advantage is taken of the deep transom sections for carrying the load to the side frames.

Clasp-type brakes are used on all wheels.

The underframe of the DL-600 is a steel weldment, and the superstructure is of welded steel plate. The rear hood encloses the engine, generator, dynamic brakes and other apparatus, while the front hood provides space for steam generating equipment. The section over the engine and generators is removable and the radiators are located at the back of that hood.

The cab is of welded steel with controls and engineman's seat on the right facing the front, and a second seat on the left side of the cab. Doors are located in the right side of the rear wall and the left side of the front wall, as well as in the front cab wall for ease of access to the steam generator compartment.

The cab is designed for the comfort and safety of the operating crew, with emphasis on roominess, visibility and low noise level. A new, low control stand has been installed to provide the best possible crew communication. The stand is mounted at the left of the operator's seat. It contains throttle, selector handle, reverser handle and circuit breaker-type switches for generator field and fuel transfer pump. Control circuits, headlight switches, light switches, wheel-slip indicating lamp, and the ground relay are also found on the control stand.

Air brake gauges, speedometer and load meter are located directly in front of the engineman, and signal lights for low oil pressure, hot engine water and all other instruments are situated on the bulkhead for observations from normal crew operating positions. Two large fresh air induction hot water core-type heaters, which assure ample heating capacity for any weather, are supplied. Windshield defrosters use air inducted from the cab heaters.

The brake valve is located in front of the engineman so that he can operate it while facing forward. The air brakes are Schedule 24RL. Air is supplied by the two-stage, three-cycle compressor driven directly by the main engine. The displacement at idling speed (400 r.p.m.) is 122 c.f.m., and at full engine speed (1,000 r.p.m.) is 306 c.f.m. Two main reservoirs below the underframe have a total capacity of 60,900 cubic inches.

Clean air for the dynamic braking system is provided through carbody filters located above the engine compartment doors in the sides of the hood. Air flow through the carbody filters also provides continuous medium for removing heat from the compressed air system. Air pipes are run between the air compressor and first main reservoir in parallel across carbody filters on both sides of the hood.

Automatic sanding and wheel-slip control equipment is also installed to give maximum control under all wheel slippage conditions.

The locomotive is powered by the improved Alco Model 244 engine having 16 cylinders of 9-in. bore and 10½-in. stroke and a full-load speed of 1,000 r.p.m. Engine starting is effected by using the main generator as a motor, with current supplied by storage batteries.

A gear-driven centrifugal pump circulates water through engine, radiators and lubricating oil cooler. Radiator inflow is controlled by a simplified modulated shutter control and by the variable speed of the 72-inch radiator fan, which is driven through an eddy-current clutch for speed control. Engine intake air is ducted from carbody filters direct to the water-cooled turbocharger air intake. The capacity of the cooling system is such as to keep the oil and water temperatures down to conservative figures even at high ambient temperatures.

The DL-600 can be obtained in weights ranging from 325,000 lb. on driving wheels, where light axle loading is an advantage, up to 390,000 lb. where heavy axle loadings and corresponding greater tractive effort can be utilized.

The DL-600 has continuous tractive force ratings corresponding to the gear ratios offered as follows:

Maximum speed-m.p.h.	Gear ratio	Continuous tractive force-lb.
80	64-19	65,100
75	65-18	69,800
65	74-18	79,500

The flexibility of the DL-600 can be noted from the continuous ratings shown above. The 360,000-lb. unit geared for 80-m.p.h. maximum speeds provides a continuous tractive force equivalent to 18 per cent adhesion. Thus heavy freight drags can be handled by a unit also capable of 80-m.p.h. performance in passenger service.

Where the heaviest freight movements are involved, the 390,000-lb. unit with 65-m.p.h. gearing offers a high continuous tractive force and may still operate in high-speed freight or average passenger service.

High Spots of the 1954 Interchange Rules

Changes in the rules are reviewed by T. J. Boring before a meeting of the Eastern Car Foremen's Association

CONTINUAL improvements and changes in car parts, car construction, car service, interchange requirements and problems, repair methods and billing practices together with the continually fluctuating cost of labor and repair materials necessitate periodic changes in the Rules of Interchange which are the basis of billing for car repairs and, of necessity, the final result is greatly influenced by practically all of the rules.

No one knows exactly how much the national bill for freight car repairs may be at the present time but some indication of the amount of money involved may be seen in the fact that 14 years ago an AAR survey showed a total of about 31 million dollars. Today, this would be much higher due to increases of about 168 per cent in labor and 132 per cent in materials since that time.

Because the Rules of Interchange are of such importance to the railroads, revisions are made periodically and this year's rules, effective January 1, 1954, included a number of changes which are of interest to car men. On these and the following pages these changes are outlined by T. J. Boring, general foreman, M.C.B. Clearing House, PRR, Altoona, Pa., as he presented them before the meeting of the Eastern Car Foremen's Association held in New York, February 19, 1954.

Rule 2

Section (c), second paragraph—Modified to clarify the intent that loaded "Total Weight on Rail" limits shown in table of Rule 86 are based on four axles per car, as already stated in Rule 86-(a).

Section (d-1)—Modified to require that portable heaters, in refrigerator cars, using methyl alcohol, etc. as fuel, must be "*fastened securely*" instead of "by at least four chains (two at top and two at bottom)."

New Note—Added to provide that "Refrigerator cars having permanent tanks for heater fuel may be rejected in interchange unless all fuel has been drained from tanks, drain plugs reapplied, suitable tag applied to or near fuel tank so indicating and waybill marked accordingly."

New Section (d-3)—Added as follows: Refrigerator cars equipped with installations using gasoline to operate units for refrigeration purposes, are acceptable in interchange (for freight movement only) except where routed to or through areas where railroad has placed restrictions specifically prohibiting the operation of such cars. Railroads having such areas where the operation of such cars is prohibited or restricted, shall so indicate by publishing the location and extent of such areas by means of a suitable Note in the publication Railway Line Clearances. Owners of cars equipped with such installations must indicate by a suitable explanatory note in the Official Railway Equipment Register the reporting marks, serial numbers and kind of equipments using fuels that would subject them to restricted operation as provided herein. All such cars must be permanently placarded GASOLINE DRIVEN REFRIGERATION UNITS.

In compliance with these requirements, our Company and others have published their restrictions in Railway Line Clearances Circulars No. 12 (12/2/53) and Nos. 12-A (12/29/53) and 12-B (1/27/54).

On the back of Circular No. 12 was printed Circular No. T-234 of the A.A.R. O.—T. Div. dated 8-13-53 quoting this new Rule 3-d-3, and advising railroads and refrigerator car owners of the necessity of publishing their restrictions (if any), and advice of any such equipment owned.

Rule 2

New Interpretation (3)—Added to clearly indicate that defect cards covering cardable defects or authority for transfer or adjustment of lading, must be obtained at time cars are interchanged. Such cars must not be run on record under any circumstance.

Rule 3

Section (a)—Completely rearranged and modified as follows:

Paragraph (a-1-A)—Modified by eliminating reference to pressure retaining valve, 1¼" air brake pipe and angle cocks which now constitute new Paragraph (a-2-a).

New Paragraph (a-1-b)—Added to provide that all freight cars must be equipped with Type AB brakes except as exempted under I. C. C. Order, Docket No. 13528, in interchange. (This supersedes former Paragraph (a-4) and its two Notes).

New Note 1—Is first sentence of former Note 1 under former Paragraph (a-4).

New Note 2, (Page 16)—Added to cover the above mentioned exemptions for AB brakes under I. C. C. Order, Docket No. 13528, as follows:

(a) Locomotives. (b) Scale test weight cars, (c) Locomotive cranes, steam shovels, pile drivers, and similar construction and maintenance machines built prior to Sept. 21, 1945. (d) Export, industrial, and other than railroad owned cars which are not to be used in service by carriers, except for movement as shipments on their

own wheels to given destinations, provided that any such car so moved shall be properly identified by a card attached to each side of car, signed by shipper, stating that such movement is being made under authority of I. C. C. Order, Docket No. 13528. (e) Industrial and other than railroad owned cars which are not to be used in service by carriers except for movement within the limits of a single switching district. (f) Narrow gage cars. (g) Cars being returned from Canada or Mexico to owners in the United States, provided each such car being returned is routed directly to owner and is properly identified by a card attached to each side of car, signed by shipper, stating that the movement is being made under authority of I. C. C. Order, Docket No. 13528.

New Note 3, (Page 17)—Added to provide that "The movement of cars of Canadian and Mexican ownership not meeting the requirements of Paragraph (a-1-b) is permitted in interchange within the limits of the switching district at points on the international boundaries between the United States and Canada, and between the United States and Mexico."

Paragraphs (a-2-b), (a-2-c), (a-2-d) and (a-3) relative various requirements for pressure retaining valves are former Paragraphs (a-1-b), (a-1-c), (a-1-d) and (a-2) respectively, while (a-4) centrifugal dirt collector is former (a-3).

Rule 3

The effective dates of the following Sections have been extended to January 1, 1955, as announced in Supplement No. 1 (July, 1953):

Section (b-7)—Metal badge plate (brake levers).

Section (b-9)—Required braking power percentages.

Section (c-11)—Old style couplers having 5 by 7 shank (except D & E).

Section (c-12)—E type couplers, bottom rotary operated, not equipped with assembled riveted type lock lift lever and toggle.

Section (c-13)—Maximum 1½ in. vertical clearance between top of coupler shank and under surface of striking face of striker casting.

Section (t-3-b)—Cast-steel truck side frames having I, T, or L, section compression *or t*ension members.

Section (c-1), Note Following—modified to show that the A.A.R. Type F Interlocking Coupler has been advanced from experimental service to A.A.R. Alternate Standard. The remainder of this Note which specified the permissible substitution for this coupler and its yoke, disposition of parts removed, etc., has been incorporated as new third Note under Rule 17, Section (c-2) coupler substitution table. The 750 PRR Class X46 and the 320 Class X47 box cars and the 200 Class H33 covered hopper cars built last year at Altoona Works are equipped with this Type F coupler. Several other roads have recently built new cars so equipped. Prices for this coupler and parts should soon be placed in Rule 101.

Section (r-7)—An additional type of metal running board (Apex Tri-Lok, Type B-1) has been added to Group No. 3.

New Section (w-4)—Added to prohibit the use of cast-iron wheels on 70-ton capacity covered hopper cars built new or rebuilt on and after August 1, 1954, and on all such cars in interchange on and after January 1, 1956.

Second Note following: revised relative requirement for AAR Standard triple valve and pressure retaining valve, to conform with revised Rule 3-(a).

Rule 4

Section (f-3)—Modified to provide that holes through the thickness of the metal on side and end sheets of open top cars, which are equipped with A.A.R. Standard or Alternate Standard lading tie-down anchors, exceeding 1½in. measured in any direction are cardable in interchange. Where cars are not equipped with such lading tie-down anchors, the holes must exceed 3 inches measured in any direction to be cardable. In either case, if the holes are enlarged to such extent due to shifting of load from within car they are not cardable.

Rule 9

"Wheels and Axles, R. & R."—Modified to require that type of truck must be shown on W. & A. billing repair card. This form should have space for this information.

Draft Gears, or parts thereof, R&R—Modified to require that type *or class* must be shown for draft gears applied and removed. Also, that cylinder or casing number for A.A.R. Approved Miner A-2-XB (D-7940) and A-22-XB (D-7935) draft gears removed or applied must be shown. These two gears are listed in both Sections I and II of Rule 101 and showing the cylinder or casing numbers is necessary for proper identification as to A.A.R. Approved or Non-Approved type, and account of price differentials.

Rule 17

Section (c-2), New third Note following table—Added to provide that "In case of failure of the A.A.R. Alternate Standard Type F interlocking coupler or any of its attachments, it may be replaced with Standard Type E coupler, Y-40 yoke, and front follower, without any alteration being required. Any parts removed should be held and reported to car owner for disposition under Interpretation (C-2). The reverse substitution is permitted only where Type F coupler is standard to car." This new Note was formerly Note under Rule 3-c-1. See comments under same showing new cars recently so equipped.

Section (e), Note 4 following table—Modified by adding the Number of the A.A.R. Standard Specifications for repairs to A.A.R. Standard No. 18 brake beams (Certified), and for repairs to A.A.R. beams (non-Certified) Nos. 2, 2-plus, 3 and 15.

Rule 17

Sections (i-l) & (i-6)—Modified to include the Miner Type RF-333 draft gear among the rubber cushioned gears for which an A.A.R. approved draft gear can be substituted as correct repairs. Rubber cushioned gears may not be substituted for friction draft gears, nor for each other.

Section (m), third paragraph—Modified to provide that "Defective or missing bottom rod and brake beam safety supports from which A.A.R. approval has been withdrawn, must be replaced with A.A.R. Recommended Practice designs or with Approved Equivalent types to justify charge. Renewals in kind of such supports *com-*

plete are considered temporary repairs, no bill." Approval was withdrawn (effective 8-1-53) from the Universal cable type brake beam safety support. Charge may be made for repairs to this device but not for renewal complete. This Universal support has been superseded by G. N. brake beam safety support which is Item 20 in Approved List on Page 237.

Interpretation (M-10)—Second paragraph of Answer modified to require that any "undamaged special helical springs and spring plates removed" with elliptic truck springs must also be held and reported to car owner for disposition.

Rule 19

New Item 23—Added to prohibit the application to foreign cars of "Bottom rod and brake beam safety supports complete from which A.A.R. aproval has been withdrawn." See remarks above under Rule 17-(m).

Rule 23

Section A—Paragraph 2. Preparation—New sentence added to provide that all galvanized metal must be removed before welding metal running boards, brake and dome steps and platforms.

New Paragraph 6—Added to provide that after welding is performed on metal running boards, brake and dome steps and platforms, "all iron oxide scale must be removed and protective coating applied."

Section B, Welding Limitations—New Items Brake steps, metal and dome steps and dome platforms added to provide that "No welding permitted except for restoring original construction weld."

Hand Brakes, Geared—New Note added as follows: "Electric arc welding of brake rod jaws and eyes to the vertical pull rod is permissible, provided the welding is performed as outlined in figures 17 and 18", which are added as pages 113 and 114.

Running boards (Aluminum)—New Item added to show that "No welding of cracks or fractures permitted."

Running Boards, (Metal Steel) (Except Tank Cars)—New Item added to provide for "Welding of cracks and fractures permitted up to 50 per cent of sectional area of complete section", for "Longitudinal running board between the end running board saddles", and for "Latitudinal running boards." Such "sections must be removed from car for welding repairs." No welding is permitted on longitudinal running board extending beyond the ends of car except for restoring original construction weld.

Running Boards, Metal (Steel) (Tank Cars Only)—New Item added to provide "No welding of cracks or fractures in running board sections permitted, except for restoring original construction weld or if over running board support. Welding in connection with splicing of running board sections over body bolsters, center sills and across supports for purpose of renewing sections at these locations permitted.

Wedges, Journal Bearing—Modified to provide for reclamation of journal wedges by "reforging" as well as by fusion welding, and "restored" to new dimensions, and classified as new.

Also to permit reclamation of journal wedges by machining or grinding, and classified as secondhand, provided:

(a) "Original top contour of wedge is restored." (b) "Nominal thickness of crown is not reduced more than 3/32 in.;" (c) "Length over contact surfaces is restored to nominal dimensions if reduced more than 1/16 in."

New Rule 26

Added as follows: "Auto loading devices in box or automobile cars must be lubricated after expiration six months (except when device is permanently secured in raised position), in accordance with instructions posted adajacent to each doorway inside of car, and stenciled to indicate place, month, day and year and railroad reporting marks as shown on Page L-40 of the A.A.R. Manual of Standard and Recommended Practice.

"This work should be performed either by car owner or road conditioning car for loading. No charge is permissible for inspection, testing, lubrication or stenciling. However, charge may be made for any repairs or renewal of details found necessary and performed."

Rule 32

Section (12-a). Contamination—All concerned should be cautioned that cars selected or placed for the loading of contaminating commodities must be confined to cars suitable only for rough freight loading. Also fully carry out the provisions of Section (12-b) when contamination damage is discovered in foreign or system cars, and make complete report to office specified.

Rule 49

Sections (c) and (d)—Rearranged and modified to provide for more accessible locations of placards boards and cardboards on house and refrigerator cars, to coincide with changes to be made in the A.A.R. Manual of Standard and Recommended Practice.

Rule 60

Section (f)—Modified to provide for alternate location of air brake stenciling on hopper cars where construction of car will permit. This stenciling may be located on subside sill near release rod if this location presents a clearer view than that on end or side of auxiliary reservoir. The Note on sketch preceding this paragraph is modified accordingly.

General—More care must be exercised in removing all old Air Brake Cleaning marks, by *scraping off* before painting over with quick-drying paint, preferably black; also in recording the old markings. Failure to do so results in claims for refunds under Section (h), as well as when retaining valve or dirt collector is not cleaned. The same care is also necessary in the recording and removal of old stencil markings for Repacking of Journal Boxes, and application of the new stenciling.

Section (L), Note 4—Modified to provide specific pressure, 7 to 9 tons, to be used in reconditioning old style back cover of service portion of AB brake valve.

Rule 61

Sections (a-1) and (a-2)—Require that brake beams, hangers, pins, brackets, levers, etc. should be inspected and any necessary repairs made when car is on repair

track for any reason. It has been amplified to the effect that when foreign and private line freight cars receive periodic COT&S of air brakes account of overdate, the trucks should be removed for this inspection and any repairs found necessary. Our road for some years has been doing this when repacking journal boxes on system cars.

Rule 66

Interpretation (4), first Note—Modified to provide that stenciling of solid block not less than 1½ in. square to indicate freight or passenger cars are equipped with approved packing retainer devices, should be of contrasting color instead of restricting same to white only.

Interpretation (4), third Note—Second paragraph addead to provide that "Modern 'long' spring type Packing Keeper, Drawing 1306, may be applied to any size journal boxes of separable bolted type by car owner to the extent authorized by the A.A.R. Lubrication Committee." No PRR cars are so equipped to date.

Interpretation (4), third Note—Third paragraph added to provide that spring type packing retainer devices of any size *other than* the Hold-Rite approved "short" types. Drawings Nos. P-14-4-4000 and P-14-4-5000, and the Modern "long" spring type Packing Keeper, Drawing 1306, mentioned above, must not be applied to separable bolted type journal boxes, and if so found may be removed when car is on repair track for any reason. No charge may be made for such removal nor is any credit to be allowed car owner. The same applies to long spring type retainer devices found in integral journal boxes having waste retainer ribs. Such removals must be shown on billing repair cards.

Rule 74

Second paragraph—Modified to indicate that the cast-iron wheels covered by this paragraph refer to bracketed type.

Rule 84

The phrase "or due to rusted or pitted condition in connection with flood damage," relative journals cut or requiring reconditioning, which was added in Supplement No. 1 (July 1953), clarified that otherwise this defect is car owners responsibility per Rule 43.

Rule 86

First paragraph—Modified to show that condemning limits for center of tubular axles are in Column W, while in Column K for solid Standard axles, in the dimension tables for these axles.

Second paragraph—Modified to clarify the intent that *limits* mentioned in first sentence are *weight* limits, (i.e., Total Weight on Rail of car and lading), and also that rules referred to are the A.A.R. Loading Rules.

Rule 88

Interpretation (7)—Modified to include the Miner Type RF-333 cushion draft gear in its provisions.

Rule 101

Material Charges. Price adjustments have been made in line with recent quotations resulting in a mixed trend of minor increases and decreases except 1-W and M W wrot-steel wheels, axles, AB brake material and brake beams were increased considerably. The following principal changes have also been made in this rule:

Item 45—Piece number corrected from 96079 to 528007 and description modified to show that item covers pipe bracket portion complete, *less fittings.*

Item 45-A—Piece number corrected from 531066 to 96074 and description modified to clarify the intent that pipe bracket body *includes* 6 studs and nuts.

Item 46-A—Piece number corrected from 513748 to 520263.

Item 47-A—Modified to indicate that item covers emergency portion body *complete* as described in manufacturer's catalogue.

Item 49—Modified to indicate that item covers "piston and *hollow* rod" as described in manufacturer's catalogue.

Item 49-A—Description modified to indicate that item covers "piston *hollow* rod *collar*" as shown in manufacturer's catalogue.

Item 50-F—Modified to indicate that item covers reservoir separation plate *hex* head bolt, *and nut*, instead of *tee head* bolt.

Items 51-B and 51-C—Piece number corrected from 94913 to 94994.

Items 76 and 78—Piece numbers corrected from 33342 and 5951 to 15129 and 3134 respectively as shown in manufacturer's catalogue.

New Item 134-A—Added to provide price for "coupler bottom articulated rotor lock lifter, riveted assembly complete (E-24, consisting of E-7-A toggle, E-5 rivet, E-18 hook, E-22 rivet and E-20 connector)." Complete new couplers being purchased by our road and some others are so equipped.

Item 169-I, fourth Note—Eliminated, account modification of Item 100-A, Rule 107, which now provides that labor charge for approved packing retainer devices is permissible only when same are *applied* separately. However, it will still be necessary to show R and R or R in connection with repacking of journal boxes, wheel exchanges, etc., as outlined in Rule 9.

Item 184, new Note—Added to provide that "Items 183, 183-A and 184 do not apply to cotters over ⅜ in. in diameter or other details used to retain loop type brake hangers under Item 19-A of Rule 107." Therefore, ¾-in. cotters used for this purpose should be shown separately on billing repair cards and charged at 1 lb. under "forgings" and labor as per Item 19-A, Rule 107, when applied separately.

Item 213, Note 1—Modified by showing page number (E-115) of A.A.R. Manual of Standard and Recommended Practice which covers specifications for repairs to brake beams other than certified beams.

Item 217—Certificate of Approval number 69 added to cover additional cast-steel type hanger type brake beam manufactured in Canada. Also added to Fig. 2, brake beam identification table.

Item 221, Note 3—Modified by showing page number (E-97) of A.A.R. Manual of Standard and Recommended Practice which covers specifications for repairs to Certified (#18) brake beams.

Draft Gears, Paragraph 8—Miner Type RF-333 draft gear added as an additional rubber cushioned gear which shall be charged at 75 per cent of value new when second-hand is applied in kind.

Item 250-M, new Note 7—Added to cover conditionally

approved Miner Type RF-333 combination rubber and friction draft gear.

Weights of Miscellaneous Items (Page 233)—Weight of 1 lb. added for brake hanger retainer or brake hanger pin retainer (other than rivets or patented devices). This weight will apply to the ¾-in. cotter when used as a brake hanger retainer as mentioned above under new Note following Item 184.

A.A.R. Approved Types of Geared Hand Brakes (Page 233)—URECO D-2375-A has been added to "Vertical Wheel Type."

A.A.R. Approved Types of Journal Box Lids (Page 235)—Union Spring and Manufacturing Co. lid No. 289 added in the 6½ by 12 size.

List of A.A.R. Approved Equivalent Brake Beam Safety Supports (Pages 235, 236 and 237)—Modified to include item numbers for better reference and three new approved types added. These are:

(17) G. A. T. Corp. Drawing No. 22590-A. For spring-plankless trucks.

(20) Grip Nut Co. Drawing No. 53290 G. N. brake beam safety support. (Conditionally approved). Consists of cable, pipe section, 2 housings, 2 wedges and 2 U bolts. Note provides that this device may be used during conditionally approved status as outlined in Section (m) of Rule 17 but must not be applied to cars built new or rebuilt. This supersedes the Universal.

(22) Ortner Co. Drawing No. 2870. Combination brake beam and bottom rod support.

Table also modified to indicate by an asterisk (*) and note at bottom, those brake beam safety supports equipped with brake beam release or leveling features as mentioned in Section (m) of Rule 17.

List of A.A.R. Approved Equivalent Bottom Rod Safety Supports, (Pages 237 and 238)—Ortner Co. Drawing No. 2870 added. Same combination brake beam and bottom rod support as shown in preceding table as Item 22.

List of Packing Retainer Devices Approved for Roads Desiring to Use Them, second Note following first table—Modified to provide that. "Modern 'long' spring type Packing Keeper, Drawing 1306," may be applied to any size journal boxes of separable bolted type by car owner to the extent authorized by the A.A.R. Lubrication Committee.

Rules 101, 107, 111

Rule 101—Material Charges; Rule 107—Labor Charges; Rule 111—Air Brake Repairs: All combination Items (those including labor and material) that were not increased since Supplement No. 1 effective 8-1-53 due to the cost-of-living escalator clause, are now adjusted accordingly, including any change in price for material included.

Rule 107

Labor Charges—Item 19-A—Modified to indicate that this item includes "pins, key bolts, plates, cotters, U retainers, split pins and patented devices" used with brake hanger bracket bushing or wear plate, renewed separately.

Item 56-A—Modified to provide labor charge for sliding insulated flush type side doors.

Item 100-A—Modified to provide that labor charge for packing retainer device covers only those applied separately.

Rule 122

Interpretation (7)—Modified to include the Miner Type RF-333 cushion draft gear as a gear the repairing line is required to furnish unless substitution is made as outlined in Rule 17.

Passenger Car Rules

Rule 2

The effective dates of the following Sections have been extended to January 1, 1955:

Section (e)—Cardboards or suitable receptacles for Defect Cards and Joint Evidence cards.

Section (f)—Brake shoe spark shields.

Section (k)—Modified to indicate that A.A.R. Standard Type H couplers are required on all passenger equipment cars, other than A.A.R. Class B, built new on and after January 1, 1955.

New Section (L)—Added as follows: "Couplers A.A.R. Standard Type H, or Type F Interlocking, required on all A.A.R. Class B cars which are otherwise equipped to render them suitable for passenger train service, built new on and after January 1, 1955. In Interchange."

Rule 7

Paragraph (e-4)—Modified to provide that "Failure of such roller bearing units not equipped with filler plugs or grease gun fittings, or having same welded in place, is car owners responsibility irrespective of date of periodic lubrication."

New Note—Added to provide that when wheels and axles with friction bearing units are substituted for wheels and axles with roller bearing units, the principle outlined in Interpretation (M-11) of Rule 17 in the Freight Code will govern, as to disposition of material removed.

Rule 15

New fourth paragraph—Added to indicate that journal bearings applied to foreign cars must be new (or relined), meeting the requirements of A.A.R. Specifications, to justify bill.

Rule 18

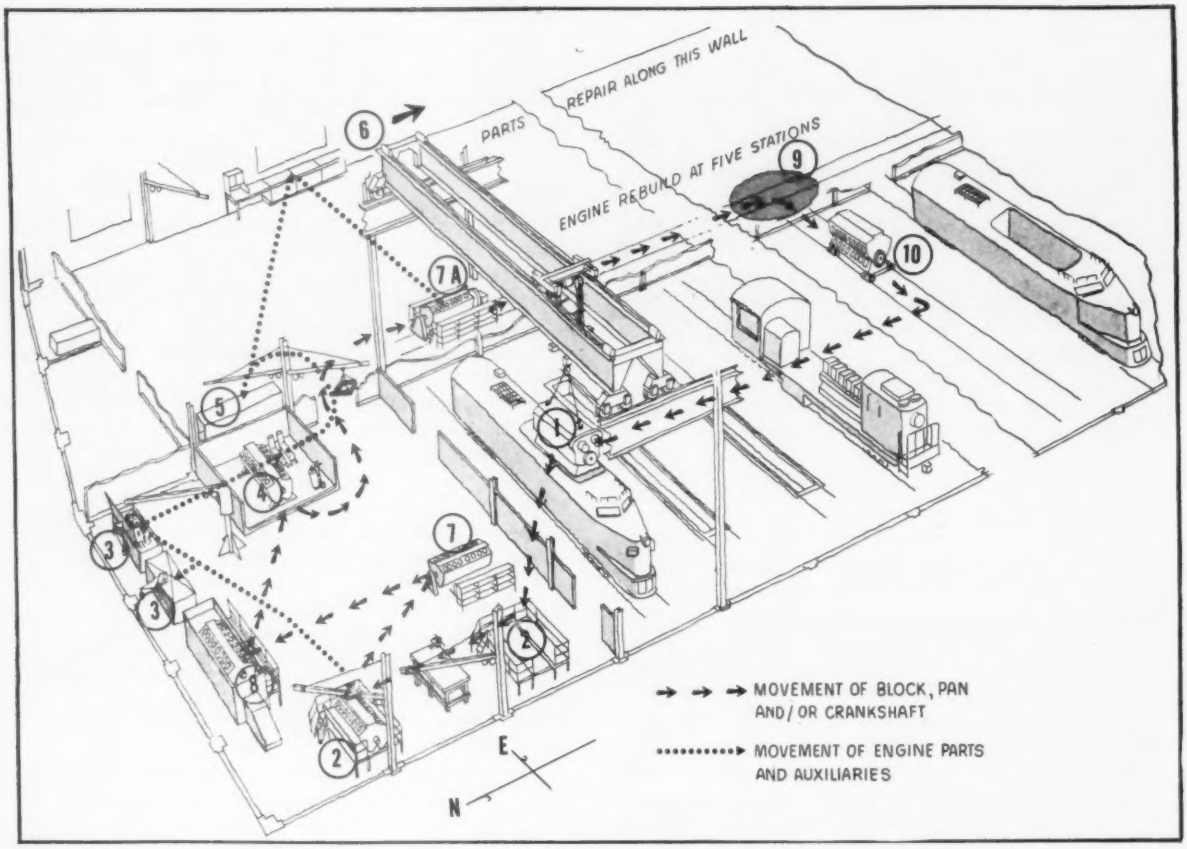
Second Note following first paragraph—Modified to provide that in arriving at the cost of reproduction of destroyed passenger cars for settlement purposes, "All additions and betterments, except air conditioning systems installed subsequent to date car was originally built, shall be depreciated from date car was originally built."

Rules 21 and 22

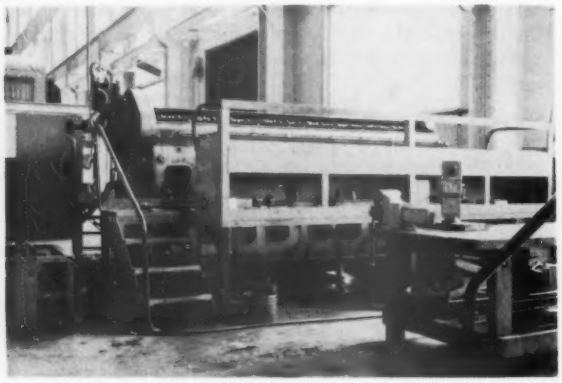
Rule 21—Labor Charges; Rule 22—Material Charges: All combination Items (those including labor and material) that were not increased since Supplement No. 1 effective August 1, 1953, due to the cost-of-living escalator clause, are now adjusted accordingly, including any change in price for material included.

Rule 22

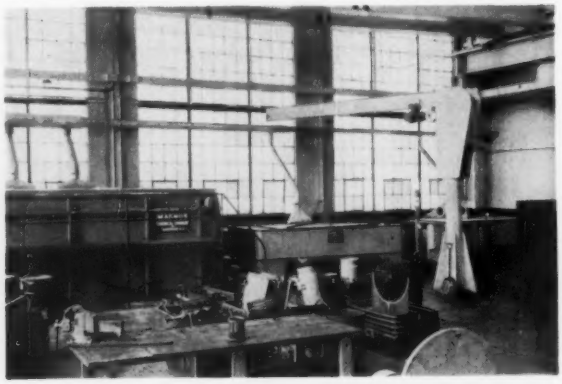
Material Charges—Adjusted in line with recent quotations resulting in some minor changes. M W wrot-steel wheels, axles and steam heat connectors were increased considerably. Where Stores Department cost is chargeable, show the price. Acct. & Ref. Nos. on Repair Card.



First stop for the engine after removal from the unit beyond the wall is at a platformed dismantling station.



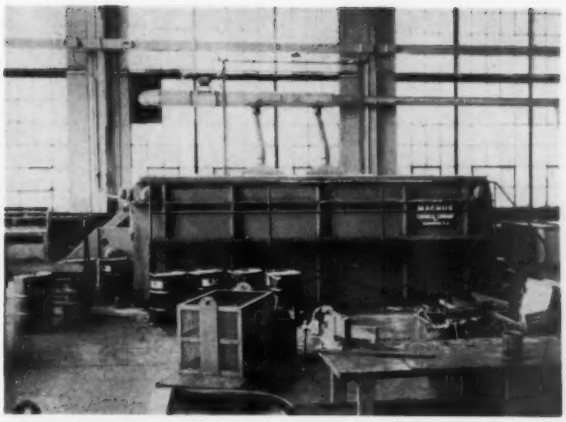
Smaller parts removed from the engine are put in a wire basket for cleaning in one of the machines at the right.



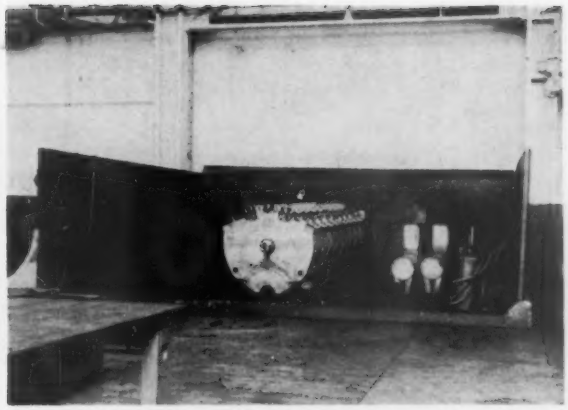
How To Clean Diesel Parts Economically

THE Wabash has set aside a room approximately 84½ ft. by 72½ ft. in the northwest corner of its new diesel shop at Decatur, Ill., for engine and parts cleaning. The room is well equipped on the interior for efficient cleaning, and its location with respect to the remainder of the shop minimizes handling.

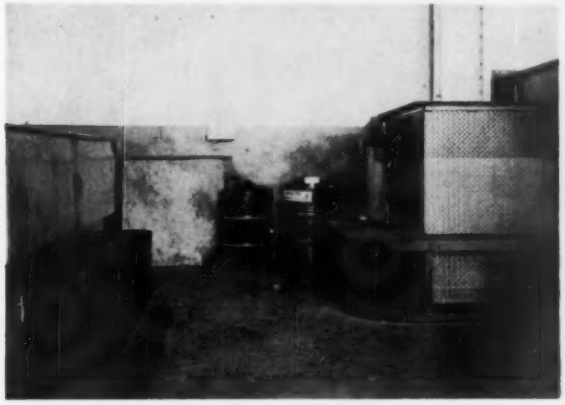
A glance at the diagram shows how the area fits into the overall work flow pattern of the shop. The locomotive



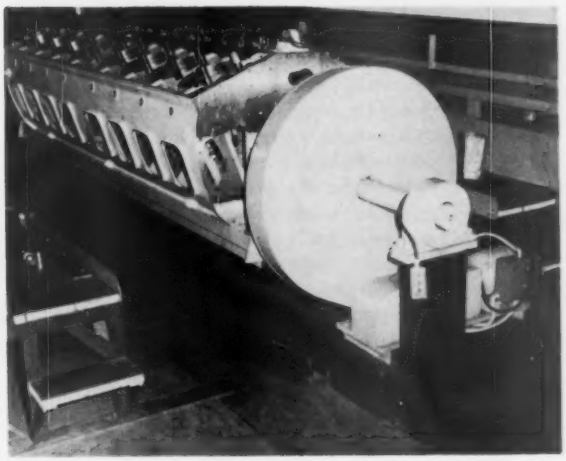
The cylinder block, pan and crankshaft are cleaned in this large Aja-Dip machine.



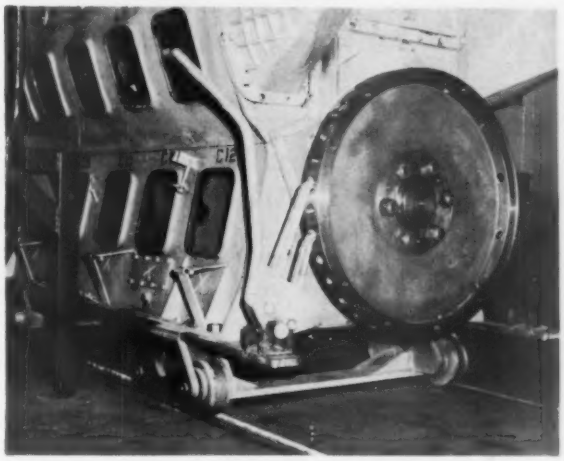
After cleaning, all parts are rinsed with a steam-hot water gun in this special rinsing enclosure.



A degreaser is placed at the north wall of the rinse booth.



Two engine roll-over fixtures facilitate removal and application of the pan and crankshaft from the block.



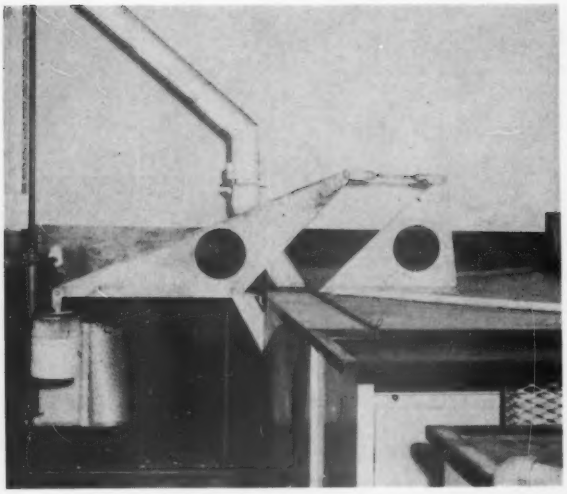
After the pan and crankshaft are applied to the block, the engine is placed on dollies to complete build-up.

stripping pits are located just to the right, or south, of the cleaning room. The engines are lifted out by the 200-ton traveling crane which serves the stripping pits, the erecting shop beyond the stripping pits, and extends into the cleaning room.

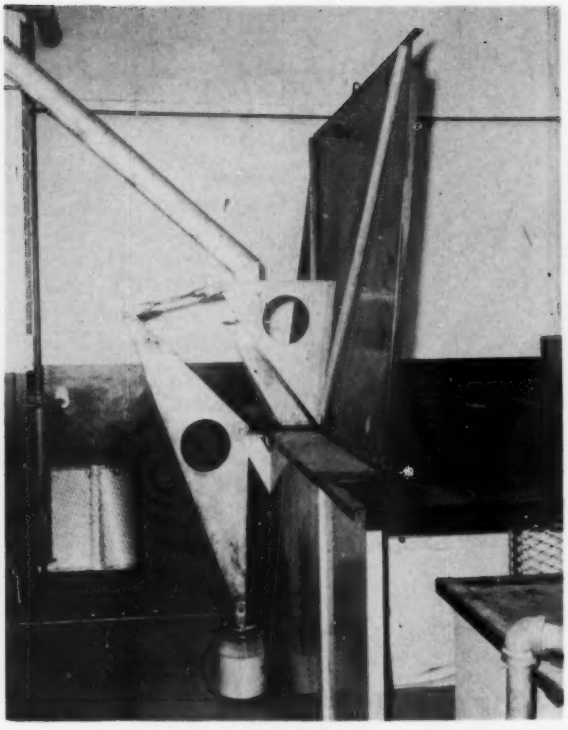
The engines, as they are removed from the locomotive, are delivered direct by the 200-ton crane to one of the two engine dismantling stations along the west wall of the cleaning room. Individual parts to be cleaned and repaired are removed at these dismantling stations, and placed in a wire basket for cleaning in one of two Magnus Aja-Dip No. 8 cleaning machines along the north wall.

After stripping has been completed, the cylinder block is moved by a 15-ton traveling crane to an engine roll-over fixture along the center of the south wall. This fixture turns the engine over to remove the crankshaft from the cylinder black. (The roll-over fixtures are convenient also to position the engine for welding operations.) A work platform is located along either side of the roll-over fixture for the disassembly work. The engine frame is moved directly from this station to the large cleaning machine along the opposite wall by the traveling crane. The crank shaft is moved directly to the rinsing booth with all parts that have been cleaned.

The rinse booth is an enclosure with a sheet-metal wall 20 ft. deep and approximately 21 ft. across. The rinse work is done by a steam-hot water gun. The smaller parts are handled between the cleaning machines and the rinse booth by a 1-ton 20-ft. jib crane with a full 360-deg. arc of travel. The cylinder block, and crankshaft are carried from the large cleaning machine to the booth by the traveling crane.



The vent was moved from the center to the side of the Aja-Dip No. 8's and the lid counterbalanced for easy opening.



The cleaned engine parts, including the pan, cylinder block, crankshaft, camshaft and miscellaneous other parts, except cylinder heads, liners and pistons, go direct from the cleaning room to the engine rebuild room beyond the east wall. The heads, liners and pistons go to a station outside the engine rebuild room for inspection and machining. The latter operation is not performed in the engine rebuild room to eliminate dust, dirt and cuttings.

The remaining parts (other than the heads, liners and pistons) are delivered to the engine room through a 10 ft. by 10 ft. door in the east wall to the right of the rinse booth. Dolly tracks extend between the cleaning and the rebuild room for delivering the major engine parts to the latter room. Parts inspection is made in the rebuild room on a Magnaglo machine just beyond this door.

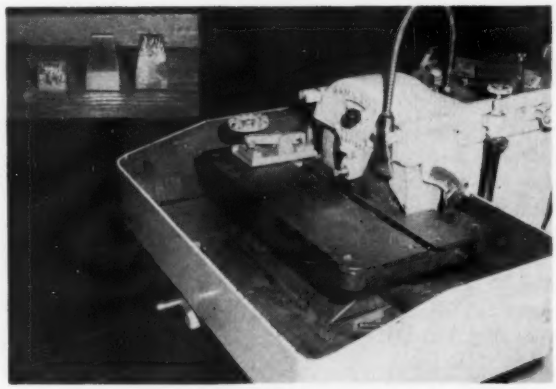
Certain electrical and mechanical parts are also cleaned in a degreasor along the north wall of the rinse booth, mainly those parts where the removal of carbon or paint is not a factor. Included in the mechanical parts handled by the degreasor are governor and some injector parts, rocker arm assemblies and other small parts off the top deck, and connecting rod and main bearing caps and bolts.

The engine is progressively re-assembled as it proceeds south approximately 210 ft. through the engine repair room to a dolly turntable. In this room the engines are rebuilt on a five-station production line along the west wall, including a second rollover fixture, while the individual parts are repaired in areas along the east wall. The completely overhauled engine is then delivered on the dolly over a turntable to a painting and storage track in the erecting shop for re-application to the locomotive by the traveling crane.

Grinding Jig for Power Contactors

The illustration shows a handy grinding fixture to hold battery field contactors, power contactors, motor field shunting contactors and auxiliary contactors. The fixture holds the different contactors for grinding on the side of the wheel. The contactor is held parallel to the side of the wheel during the grinding operation by a slot in the grinder table in which a boss on the fixture slides.

The two different angles on the face of the contactor are put on by adjusting the tilt of the grinder table. After completion of the grinding of the faces, the edges of the contactor are touched up for final finish and any burrs removed with a file.



The grinding angle of this fixture is adjusted by tilting the table. Some of the contactors handled by the jig and what one looks like after grinding are shown in the inset.

What's Wrong With Our Locomotives?

I.C.C. Bureau of Locomotive Inspection reports on the defects found by its inspectors during the fiscal year ended June 30, 1953.

THE annual report of the ICC Bureau of Locomotive Inspection for the year ended June 30, 1953 as submitted by Chas. H. Grossman director of the Bureau indicates that as the number of steam locomotives remaining in service of American railroads continues to decline as increasing number of diesel-electric units are installed the general condition of steam power, shown by the percentage found defective, is not improving. In 1948 there were 37,073 locomotives for which reports were filed. A total of 93,917 inspections were made and of these 10.0 per cent were found defective. Of those found defective about 7 per cent were ordered out of service. By 1953 the number of locomotives for which reports were filed had dropped to 15,798 and, for these, 28,899 inspections were made and 12.0 per cent were found defective. The average number of inspections per steam locomotive dropped from 2.5 to 1.8; the percentage of those found defective that were ordered out of service decreased, between 1948 and 1953, from 7.0 to 4.9 while the percentage of defects found to the number of inspection made increased from 42 to 45.

With respect to "Locomotives Other Than Steam", practically all of which are diesel-electric units the number of units for which reports were filed increased from 9,803 in 1949 to 25,374 in 1953. In 1948 approximately two inspections were made for each unit, which average had increased to three by 1953. The percentage of those found defective doubled more than, from 4.1 to 8.7, and the percentage of those ordered out of service to those found defective decreased from 2.5 in 1948 to 1.8 in 1953. The percentage of the number of defects found to inspections made decreased from 8.5 to 2.3.

The record as to the number of casualties as a result of the failure of steam locomotive boilers was not so favorable. The number of persons killed was 10, which was higher than any year since 1948.

The report included summaries, by railroads, of all accidents, showing the number of persons killed and injured due to the failure of parts and appurtenances of locomotives, as reported and investigated under Section 8 of the Locomotive Inspection Act.

The tables showing the number of accidents, the number of persons killed, and the number of persons injured have been arranged to permit comparison with previous years as far as consistent. Tables are also given showing the number of locomotives inspected, the number and percentages of those inspected found defective, the number for which written notices for repairs were issued in accordance with Section 6 of the law, and the total number of defects found and reported. The data contained therein cover all defects on all parts and appurtenances of locomotives found and reported by the Bureau's inspectors, arranged by railroads.

Summaries and tables show separately accidents and other data in connection with steam locomotives and tenders and their appurtenances and accidents and other data in connection with locomotive units other than steam.

According to the report all accidents reported to the Bureau as required by the law and rules were investigated and appropriate action taken to prevent recurrence as far as possible.

Steam Locomotives

Fifty-nine accidents occurred in connection with steam locomotives resulting in 12 deaths and 62 injuries. This represents a decrease of 63 accidents; an increase of 9 in the number of persons killed, and a decrease of 64 in the number of persons injured compared with the preceding year.

One of the tables shows the various parts and appurtenances of steam locomotives and tenders which through failure have caused serious and fatal accidents in the past five years. The report suggests that if the information contained in this table is taken advantage of and proper

REPORTS AND INSPECTIONS

STEAM LOCOMOTIVES

	Year ended June 30—					
	1953	1952	1951	1950	1949	1948
Number of locomotives for which reports were filed	15,798	20,490	26,595	29,743	33,866	37,073
Number inspected	28,899	45,220	62,113	66,809	85,353	93,917
Number found defective	3,583	6,234	7,995	6,740	7,035	9,417
Percentage of inspected found defective	12.4	13.8	12.9	10.1	8.2	10.0
Number ordered out of service	163	370	508	399	436	654
Number of defects found	12,980	24,738	34,657	28,504	28,642	38,855

LOCOMOTIVES OTHER THAN STEAM

	Year ended June 30—					
	1953	1952	1951	1950	1949	1948
Number of locomotive units for which reports were filed	25,374	22,716	19,320	15,719	12,692	9,803
Number inspected	75,170	65,263	52,948	42,503	30,684	20,798
Number found defective	6,571	6,087	4,375	2,748	1,238	853
Percentage of inspected found defective	8.7	9.3	8.3	6.5	4.0	4.1
Number ordered out of service	118	135	106	42	20	21
Number of defects found	17,163	16,613	11,935	6,325	2,804	1,745

SELECTED LIST OF PARTS FOUND DEFECTIVE, INOPERATIVE OR MISSING ON LOCOMOTIVES OTHER THAN STEAM

	1953	1952	1951
Air compressors	210	206	146
Boilers	103	69	43
Brake equipment	1,698	1,450	1,166
Cabs and cab windows	679	813	672
Cab floors, aprons, and deck plates	1,589	1,694	1,281
Controllers, relays, circuit breakers, magnet valves and switch groups	424	222	166
Draft gear	218	202	141
Driving boxes, shoes, and wedges	128	98	38
Fuel system	1,853	1,751	1,082
Internal-combustion engine defects, parts and appurtenances	4,564	4,768	3,270
Jumpers and cable connectors	156	191	190
Motors and generators	655	674	314
Sanders	1,224	1,202	902
Steps, footboards, etc.	505	480	377
Trucks	439	390	234
Warning signal appliances	122	117	83
Wheels	212	230	215

SELECTED LIST OF PARTS FOUND DEFECTIVE, INOPERATIVE OR MISSING ON STEAM LOCOMOTIVES

	1953	1952	1951
Air compressors	351	671	897
Brake equipment	1,038	1,955	2,453
Cabs, cab windows, and curtains	354	694	1,173
Crossheads, guides, pistons, and piston rods	478	1,035	1,363
Cylinders, saddles, and steam chests	455	908	1,437
Driving boxes, shoes, wedges, pedestals, and braces	345	681	1,145
Frames, tall pieces, and braces, locomotive	225	368	486
Gage cocks	211	337	495
Injectors and connections	843	1,615	2,190
Packing nuts	294	552	638
Packing, piston rod and valve stem	220	494	765
Reversing gear	216	429	631
Rods, main and side, crankpins, and collars	459	990	1,511
Sanders	324	552	806
Springs and spring rigging	1,322	2,424	3,340
Steps	321	561	805
Tanks and tank valves	466	980	1,304
Throttle and throttle rigging	327	608	927
Water glasses, fittings, and shields	357	651	858

NUMBER OF CASUALTIES CLASSIFIED ACCORDING TO OCCUPATION

UNITS OTHER THAN STEAM

	Year ended June 30—									
	1953		1952		1951		1950		1949	
	Killed	Injured	Killed	Injured	Killed	Injured	Killed	Injured	Killed	Injured
Members of train crews:										
Engineers	..	14	..	15	..	11	..	15	..	12
Firemen	..	36	..	31	1	30	..	21	..	14
Brakemen	..	12	1	12	..	4	..	3	..	6
Conductors	..	5	..	4	..	..	..	4	..	..
Switchmen	..	2	..	8	..	5	..	1	..	4
Maintenance employees	..	4	..	6	1	3	..	3	..	8
Other employees	..	2	..	1	..	13	1	2	..	13
Nonemployees	..	13	..	..	..	63	2	1	..	10
Total	..	88	1	77	2	129	3	50	..	67

STEAM LOCOMOTIVE ACCIDENTS

	Year ended June 30—									
	1953		1952		1951		1950		1949	
	Killed	Injured	Killed	Injured	Killed	Injured	Killed	Injured	Killed	Injured
Members of train crews:										
Engineers	4	23	1	36	2	51	2	64	3	75
Firemen	4	21	2	45	3	62	2	64	3	92
Brakemen	3	8	..	19	1	20	2	29	1	30
Conductors	..	3	..	3	..	6	..	4	..	7
Switchmen	..	2	..	2	1	8	..	5	..	6
Roundhouse and shop employees:										
Boilermakers	..	..	..	2	..	2	..	2	..	2
Machinists	..	1	..	2	1	2	..	1	..	4
Foremen	..	1	..	2	..	2	..	1	..	..
Inspectors	..	..	..	..	..	2	..	2	..	..
Watchmen	..	..	..	2	1	..	1	4	1	..
Boiler washers	..	..	..	..	..	..	..	..	..	..
Hostlers	..	..	..	8	1	4	..	1	1	8
Other roundhouse and shop employees	..	2	..	2	..	2	..	2	1	4
Other employees	..	..	..	1	..	3	..	4	..	6
Nonemployees	1	1	..	2	4	6	..	1	..	9
Total	12	62	3	126	14	170	7	184	10	243

inspections and repairs made in accordance with the requirements of the law and rules, many accidents will be avoided.

During the year 12.4 percent of the steam locomotives inspected by our inspectors were found with defects or errors in inspection that should have been corrected before the locomotives were put into use; this is a decrease of 1.4 percent from the results of the preceding year. One hundred and sixty-three locomotives were ordered withheld from service by our inspectors because of the presence of defects that rendered the locomotives immediately unsafe; this is a decrease of 207 locomotives compared with the preceding year.

Explosions and Other Boiler Accidents

Four boiler explosions occurred in the fiscal year; all were caused by overheating of the crown sheet due to low water. Ten persons were killed and two were injured in these accidents. The number of boiler explosions was the same as in the preceding year; there was an increase of nine fatalities and a decrease of four in number of injuries compared with the preceding year.

Three of the explosions occurred on locomotives in freight-train service and one on a locomotive used in switching service. All explosions were caused by overheated crown sheets due to low water.

One locomotive used in freight service was equipped with a low water alarm in which a fusible metal element was designed to function in case of low water and cause a warning whistle to blow. Examination of the boiler subsequent to the accident disclosed that the fusible metal was missing, indicating that the alarm had functioned, and that the water level at time of the explosion as shown by sheer discoloration was aproximately 5½ inches below the highest part of the crown sheet.

Examination of a second locomotive after the accident disclosed that a leak at the top of an eroded water glass resulted in maintenance of a visible water level that was materially higher than the actual water level in the boiler. No defects were found on the remaining two locomotives which would have contributed to the accidents.

Fourteen boiler and appurtenance accidents other than explosions resulted in injuries to 17 persons. This is a decrease of 17 accidents, a decrease of 1 in number of persons killed and a decrease of 13 in number of persons injured as compared with the preceding year.

Extension of Time for Removal of Flues

Six hundred and thirty-two applications were filed for extension of time for removal of flues, as provided in Rule 10. The Bureau's investigations disclosed that in 47 of these cases the condition of the locomotives or other circumstances were such that extensions could not properly be granted. Two were in such condition that the full extensions requested could not be authorized, but extensions for shorter periods of time were allowed. Seventeen extensions were granted after defects disclosed by our investigations were required to be repaired. Forty-one applications were canceled for various reasons. A total of 525 applications were granted for the full period requested.

Locomotive Units Other Than Steam

Seventy-five accidents, resulting in injuries to 88 persons occurred in connection with locomotive units pro-

pelled by power other than steam. This represents an increase of 1 in the number of accidents, a decrease of 1 in the number of persons killed and an increase of 11 in the number of persons injured compared with the preceding year.

During the year 8.7 percent of the locomotive units inspected by our inspectors were found with defects or errors in inspection that should have been corrected before the units were put into use; this represents a decrease of 0.6 percent compared with the results obtained in the preceding year. On hundred and eighteen locomotive units were ordered withheld from service by our inspectors because of the presence of defects that rendered the units immediately unsafe; this represents a decrease of 17 units compared with the preceding year.

The chart on page 6 shows the relation between percentage of defective locomotive units and the number of accidents and casualties resulting from failures thereof, and illustrates the effect of operating locomotives other than steam in defective condition.

Specification Cards and Alteration Reports

Under Rule 54 of the Rules and Instructions for Inspection and Testing of Steam Locomotives, 48 specification cards and 1,879 alteration reports were filed, checked, and analyzed. These reports are necessary in order to determine whether or not the boiler represented were so constructed or repaired as to render safe and proper service and whether the stresses were within the allowed limits. Corrective measures were taken with respect to numerous discrepancies found.

Under Rules 328 and 329 of the Rules and Instruction for Inspection and Testing of Locomotives Other Than Steam, 2,880 specifications and 805 alteration reports were filed for locomotive units and 678 specifications and 294 alteration reports were filed for boilers mounted on locomotive units other than steam. These were checked and analyzed and corrective measures taken with respect to discrepancies found.

No formal appeal by any carrier was taken from the decisions of any inspector during the year.

ACCIDENTS AND CASUALTIES CAUSED BY FAILURE OF SOME PART OR APPURTENANCE

STEAM LOCOMOTIVE, INCLUDING BOILER, OR TENDER

	Year ended June 30—					
	1953	1952	1951	1950	1949	1948
Number of accidents	59	122	167	169	228	341
Percent increase or decrease from previous year	51.6	26.9	1.2	25.9	33.1	5.3
Number of persons killed	12	3	14	7	10	15
Percent increase or decrease from previous year	[1]300.0	78.6	[1]100.0	30.0	33.3	6.3
Number of persons injured	62	126	170	184	243	361
Percent increase or decrease from previous year	50.8	25.9	7.6	24.3	32.7	22.2

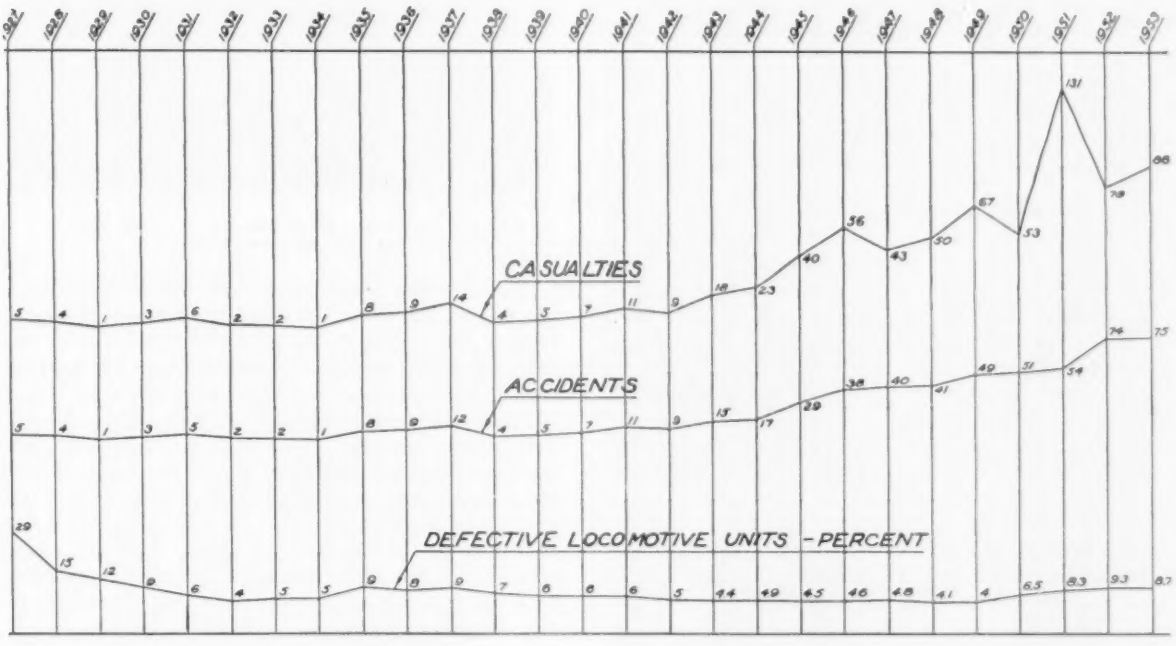
STEAM LOCOMOTIVE BOILER[2]

	Year ended June 30—							
	1953	1952	1951	1950	1949	1948	1915	1912
Number of accidents	18	35	51	59	81	104	424	856
Number of persons killed	10	2	3	4	9	14	13	91
Number of persons injured	19	36	59	70	94	108	467	1,005

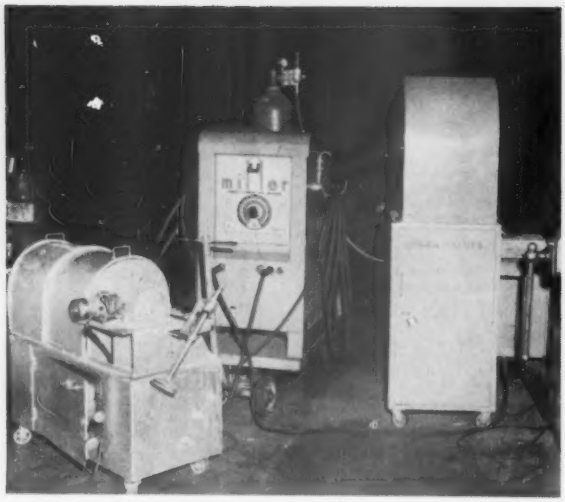
LOCOMOTIVE UNITS OTHER THAN STEAM

	Year ended June 30—					
	1953	1952	1951	1950	1949	1948
Number of accidents	75	74	54	51	49	41
Number of persons killed	..	1	2	3	..	..
Number of persons injured	88	77	129	50	67	50

[1] Increase.
[2] The original act applied only to the locomotive boiler.



Relation of defective locomotive units to accidents and casualties resulting from failures



The turning fixture at left, generator and argon cylinder in center, and sigma welding machine under its removable hood on right

Welding Fixtures Speed Piston and Valve Reclamation

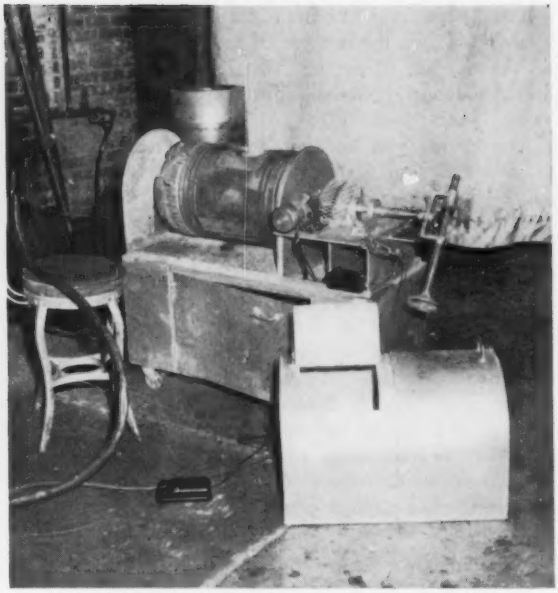
Half the trick of building up ring grooves on a worn-out aluminum diesel piston is a fixture which holds and rotates the piston at desired speeds during Sigma welding. The Minnesota Transfer Railway has designed a highly efficient piston-turning device, which not only rotates the piston, but holds and turns diesel valves for hard-facing operations. The welding is done by a SWM-2 portable Sigma welder with hand torch as furnished by Oxweld Railroad Service Company, a Division of Union Carbide and Carbon Corporation.

This compact fixture consists of a cabinet-like stand made of ¼-in. welded sheet metal, upon which is mounted the turning mechanism. Two ½-in. metal plates which support the turning shaft are welded 2½-ft. apart in an upright position on top of the stand. The tops of these plates are cut in a half-circle to accommodate a light metal hood which fits over the work and retains the pre-heat.

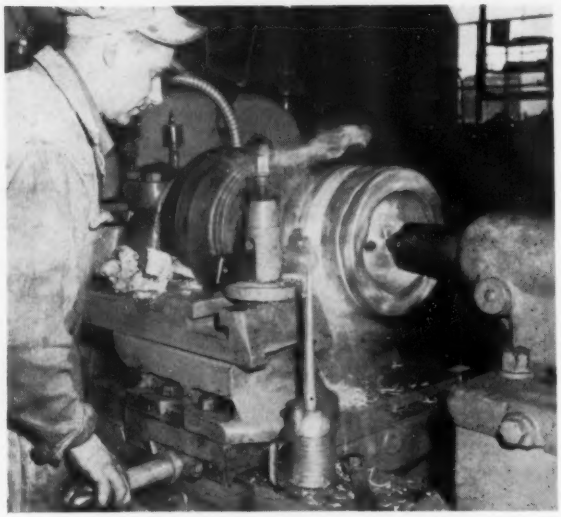
The piston is held in position lathe-fashion. It is threaded on the top end to fit and tighten onto a small arbor. A center head on the power shaft fits into the bottom end of the piston for turning. Welding is performed down-hand through a 12 in. by 8 in. opening in a hood. A metal door closes over the opening between operations to prevent loss of pre-heat.

Before ring grooves on the piston are built up, the grooves are machined out 1/16 in. on each side and on the bottom. This is followed by pre-heating to 300-400 deg. F. with an oxyacetylene blowpipe after which the ring grooves are built up with Oxweld No. 23, 1/16-in. aluminum rod. A single ring groove on a 12½-in. piston can be built up in 30 min. with reverse polarity d.c. at 240 amperes. Argon flow is 25-30 cu. ft. per hr. After welding, the piston is machined to original size and new ring grooves are cut.

An extension of the piston-turning shaft permits its use in the rotation of a diesel engine valve for hard-facing work. The end of the shaft is set in a small fixture which holds the valve at a 45-deg. angle for down-hand welding. Bevel gears on the end of the shaft and on the fixture transmit the turning motion from the shaft to the valve.



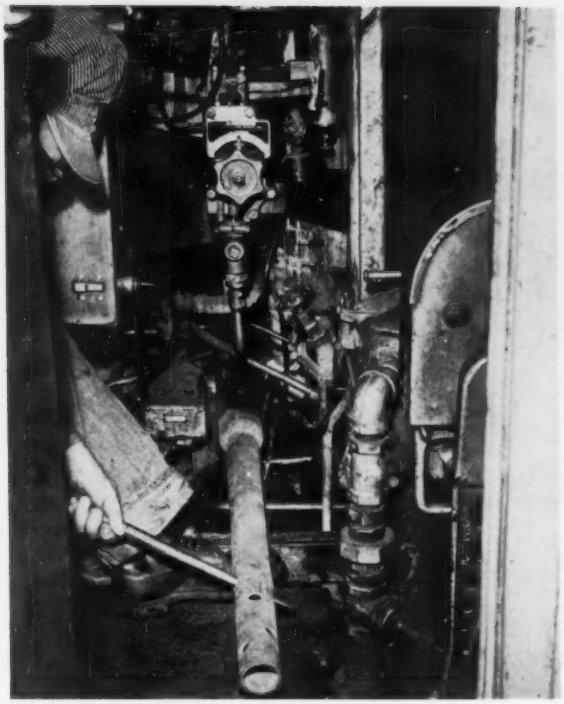
The combination piston-and-valve turning fixture and the hood that fits over the piston-turning section to keep in pre-heat



Lathe to turn the built-up piston down to its original dimensions, after which new ring grooves are machined-in

Valves are hard-faced with Haynes Stellite No. 6 Rod, 3/16-in. diameter, using an Oxweld W-24-R oxy-acetylene blowpipe fitted with a No. 15 tip. A 1/16 to 1/8-in. deposit can be applied to a 4-in. valve in approximately 3 min. with this set-up. Grinding completes the operation.

Power for the unit is supplied by a 1/25-hp. 5-volt, 8,000 r.p.m. a.c. motor equipped with a gear reduction unit and governor assembly. Variable revolving speeds from 19 to 197 in. per min. are made possible by the use of a foot-operated rheostat.



Wrench Removes Temperature Limit Control

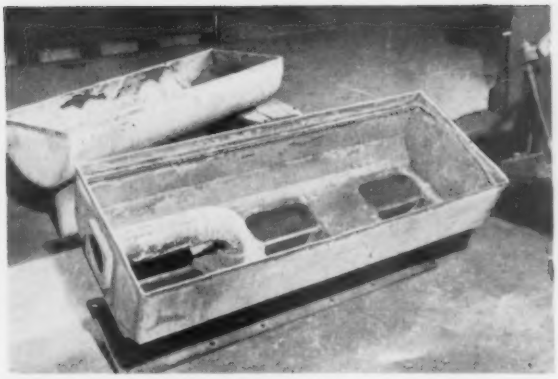
Removal of the temperature limit control on Vapor No. 4625 steam generators is simplified by the use of a wrench built at the Frisco diesel shop in St. Louis. While it is still necessary to remove the coil blow-down valve and some of the piping to insert the wrench in position, the wrench eliminates the need for removing the dome.

The wrench is made of a length of pipe and a length of tubing welded together. The pipe is standard 2 in. with suitable holes for turning with a steel bar. The steel tubing has an inside diameter 2½ in., an outside diameter 3¼ in., and a slot cut in the end to engage the steam temperature limit control.

Manifold Repair And Modification

One road has developed a procedure for repairing Electro-Motive manifolds and reducing future troubles, which begins by first cutting the manifold in two. The silencer tube plate is cut out and a 3/16-in. plate is rolled to the same shape. Holes for the tubes are burned in this plate at the right pitch and the tubes welded in place. The completed sub-assembly is then set in the bottom half of the manifold, rewelded in place and the top half welded to the lower half to complete the repair.

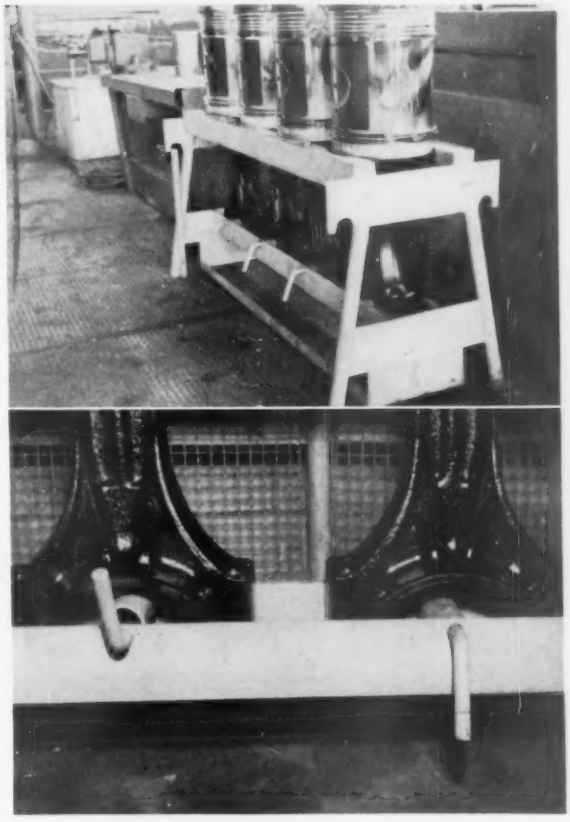
If the water pipe leaks, it is cut off several inches inside the manifold and a new section of pipe welded in. To do this, the entire head is cut out and set back ½ in. to ¾ in. This permits welding the pipe both to the head and to the flange on both sides, eliminating the gap between the end of the manifold and the inside of the pipe flange.



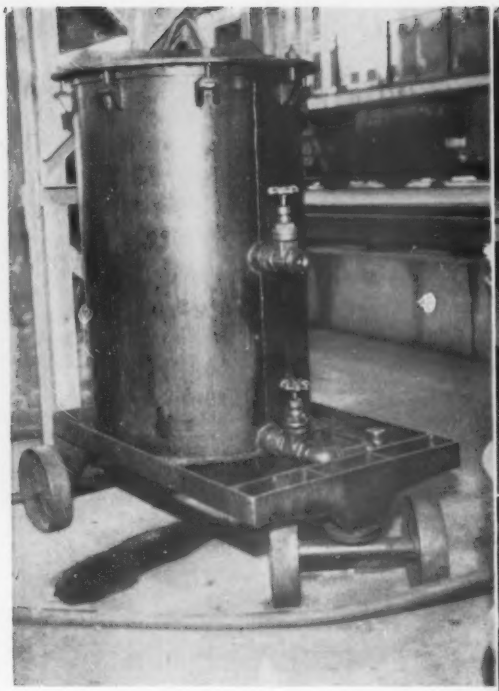
Manifolds are repaired, and in some cases the design modified to eliminate water pipe leaks, after being cut in two.

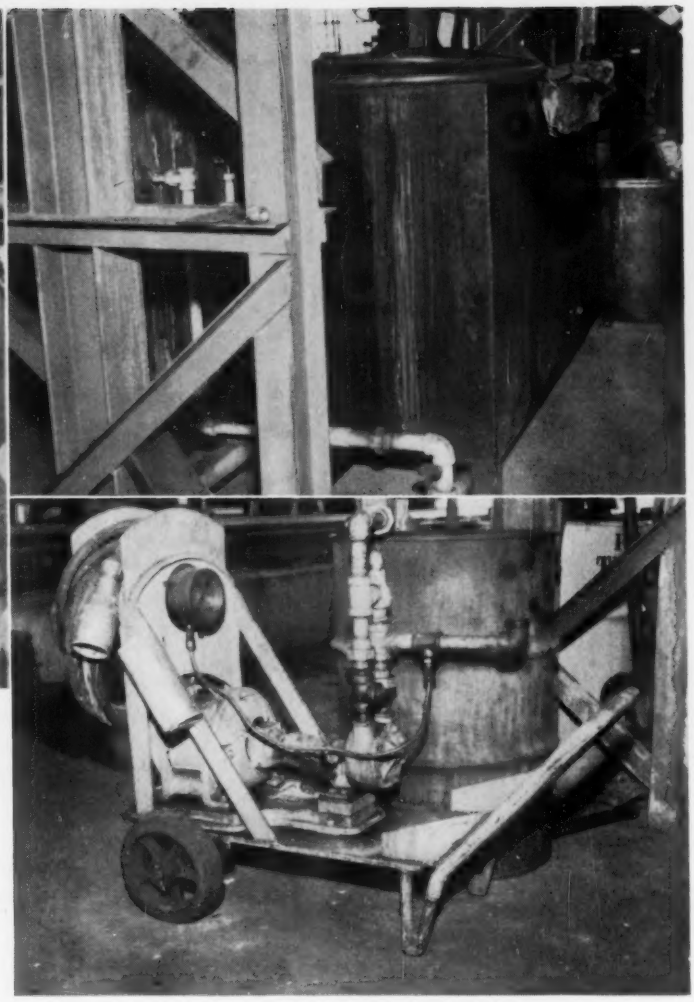
Diesel Shop Ideas On Chicago Belt

A number of interesting devices have been developed at the diesel shop of the Belt Railway of Chicago, among which are a rack that supports diesel switcher bodies, a cylinder assembly rack with an arrangement that simpli-

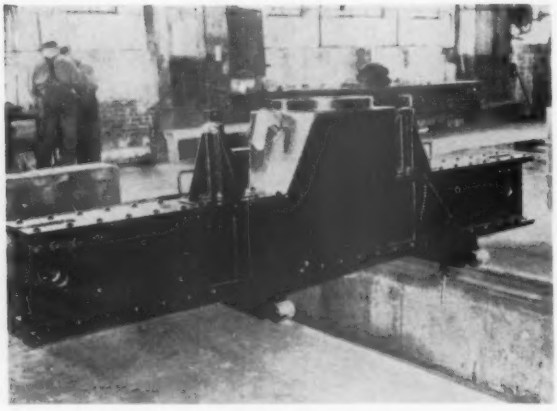


Rack to simplify wrist-pin removal.





Lube and fuel-oil handling and filtering equipment and rack (below) to support diesel switcher bodies.

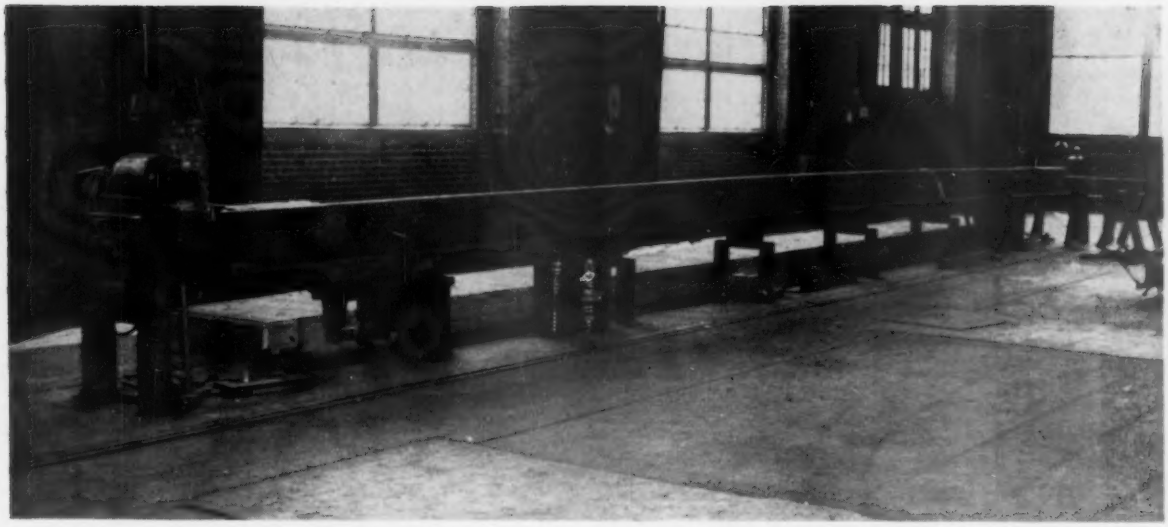


fies removal of the wrist pin, and an arrangement for storing or filtering oil on switchers.

The rack to support diesel switcher bodies comprises an I-beam, to the top center of which has been added an extension containing a dummy center plate. Two screw jacks are mounted along either side of the dummy center plate, and these support the side bearings. The entire rack can be easily moved along the rails on the four small rollers which support the rack when empty and which lift up when a locomotive body is in place.

The cylinder assembly rack is equipped with an eccentric crank under each of the four assemblies to take the load off the wrist pin for easy removal. The crank is made by welding a shaft to a piece of hollow steel tubing on the inner circumference of the latter, and bending one end of the shaft to form a handle for turning. When the handle is raised, the roller, being mounted eccentrically on the shaft, contacts the crankshaft bearing of the rod through a piece of rubber to support the weight of the rod, thereby making it easy to remove the wrist pin.

Three units are used for handling lube oil and fuel oil. Referring to the illustration of the oil handling devices, the view in the upper right shows an 800-gal. tank for saving fuel oil or lube oil when a fuel tank or the engine is to be worked upon. At the upper left is a portable filter which is used for filtering lube oil on switchers which are not equipped with their own filters; the oil is filtered 6 hours per month. At the lower right is the pump used to transfer the oil to the filter or to the storage tank.



The center sill welding jig showing the clamping, lifting and camber cylinders.

Assembling Center Sills for Welding

The two halves of a center sill are squeezed together at the C&EI Danville Shops by an air cylinder for assembly on a large welding jig. The air cylinder has a foot on one end of the piston rod and a lever on the other which squeezes the two halves together as air is admitted to push the piston rod out. The cylinder is mounted on four wheels and rolls down the length of the sill halves to repeat the squeezing procedure at suitable intervals.

The procedure employed is to squeeze the two halves of the center sill together beginning at the near end of the jig shown in the illustration. After the near end is squeezed together, it is held by a heavy steel gage which fits snugly over the two halves and holds them tightly together. The cylinder, which is mounted on rollers, is then moved down a few feet and this part of the two sections squeezed together. With the two sections held snugly in place by the air cylinder, a second-type gage is slipped into place to hold them together. These procedures are repeated until the center sill sections are clamped together at regular intervals along the entire length.

The cover shown on the end of the jig serves as a table to run the cylinder off the end of the sill for loading and unloading the jig. The cylinder and clamp near this cover, in conjunction with a duplicate arrangement near the other end, holds down the center sill section to put the camber in the finished sill. A third set of cylinders lifts the center sill off the jig after welding has been completed.

Safety Wheel Chocks

Cars are held from moving on the Missouri Pacific rip track at Dupo, Ill., by pairs of wheel chocks joined together by a chain. One wedge fits on each side of a wheel to prevent movement in either direction. The pair are joined permanently by a chain to prevent not only the loss of one, but also to simplify storing and finding the set.

The wedges, roughly triangular shaped as shown in the illustration, are 6 in. long, 3½ in. high and 2¾ in. thick. The chain joining the two together is 30 in. long with $\frac{3}{16}$-in. links. The ends are held to the block by $\frac{3}{8}$-in. bolts.

Wheel chocks that prevent movement in either direction.

Questions and Answers

Diesel-Electric Locomotives*

Re-assembly and Installation

988-Q.—What method should be used for assembly?

A.—Reverse the procedure described above.

989-Q.—What should be done after the pump has been assembled?

A.—After assembly at gear support, the shaft must be moved endways and have 1/16" minimum end clearance.

990-Q.—What assures positive alignment when installing the pump?

A.—A boss on the back of the pump assures positive alignment.

991-Q.—What precaution should be taken?

A.—Make certain that the thrust washer is applied to the spline end of the pump before mounting it on the engine.

Water Inlet Headers and Branch Pipe

992-Q.—What is the function of the water inlet headers.

A.—Each bank of cylinders receives its cooling water from headers bracketed in the engine room below the camshaft decks.

993-Q.—Describe the headers further.

A.—Headers are fitted with side outlet flanges for the connection of jumpers which conduct the water to the inlet at the bottom of the water jacket.

Removal

994-Q.—What procedure should be followed for removal of the headers?

A.—Remove the camshaft casing lube oil drains that will interfere with withdrawal of the headers from the free end of the engine.

995-Q.—What should follow?

A.—Remove the discharge elbows of the water pump.

996-Q.—What should be done next?

A.—Remove branch pipes or jumpers by removing capscrews at flanged connections to header and slacking off on capscrews at the gland so that the rubber expansion seal in the jacket wall will be free.

997-Q.—May the water headers now be removed?

A.—Yes.

Inspection and Maintenance

998-Q.—What inspection should be made?

A.—Inspect the rubber expansion seals for cuts or abrasions. Check surface of jumper flanges.

999-Q.—What additional attention should be given the header?

A.—Clean the header interior.

Installation—Former Headers

1000-Q.—Do we have any trouble in aligning the former headers (when replacing) with respect to the branch pipes and water jacket?

A.—No. The dowels and dowel holes align the header properly.

1001-Q.—What is the procedure for re-installation of the headers?

A.—Apply headers in the engine block. Apply header brackets. Re-apply dowels, renew them if necessary, and secure header to block.

1002-Q.—What should follow?

A.—Apply branch pipes and gaskets, securing with capscrews and flat washers. Do not overstress the water jacket gland. Replace items that were removed to permit removal of headers and jumpers.

New Headers

1003-Q.—What is required in case new headers, jumpers or new block is installed.

A.—Re-doweling is required after correct alignment is obtained.

1004-Q.—What is the proper procedure for installation of new headers?

A.—Apply headers in the engine block. Apply header brackets and secure to side of engine. Leave capscrews to header loose, allowing header to be rotated slightly when aligning header to water jumpers.

1005-Q.—What operation should follow?

A.—Re-apply the camshaft casing lube oil drains. Apply all branch pipes or jumpers to inlet water jacket hole and header.

1006-Q.—How is the jumper gland positioned?

A.—Position jumper gland into water jacket inlet so that lug is against the liner, then back off approximately .002".

1007-Q.—What should be the next operation?

A.—Rotate header until flange of jumper seats correctly. Insert gasket between jumper and header. Secure jumper to header with capscrews and lock washers. Tighten gland to water jacket inlet and wire capscrews.

1008-Q.—Describe this operation further.

A.—Dowel header to engine frame, making sure that dowel pin does not protrude beyond surface of water header inlet flange. Use top dowel hole of header flange nearest center line of engine for re-doweling.

1009-Q.—What precaution should be taken?

A.—Do not use top outer dowel hole.

* This series of questions and answers relate specifically to the Alco-G.E. Diesel electric locomotives. The figure numbers and references, by number, to diagrams, etc., relate to the current edition of the Alco-G.E. operating and maintenance manual.

Schedule 24 RL
Air Brakes

CUTTING IN THE EQUIPMENT—*Continued*

1675-Q.—What factor must be known to the engineman?

A.—The number of vehicles in the train.

1676-Q.—Give an example.

A.—A train consisting of a three unit locomotive and 12 cars would be a 15 vehicle train and the total of 15 would be used in setting the rheostat dials.

1677-Q.—What is the first operation when cutting in the equipment after the number of vehicles in the train are known?

A.—The *ON-OFF* switch at the left of the panel is moved to the *ON* position.

1678-Q.—What should follow?

A.—Both rheostats should be turned so that the number *15* is opposite the indicator for each rheostat dial.

1679-Q.—What both rheostat dials so set, what must be done?

A.—The three position lever switch at the right should be moved to the *UP* position.

1680-Q.—What action follows?

A.—While this switch is in the UP position the milliameters are reading and the rheostats must be adjusted so that each milliameter reads *Zero.*

1681-Q.—What is the indication when the milliameter reads Zero?

A.—This insures that both the Application and Release circuit Wheatstone Bridges are balanced.

1682-Q.—What action results from placing the 3 position switch in UP position?

A.—The pulsing action of the relays is stopped and each milliameter is inserted in series with the corresponding detector relay.

1683-Q.—What action should follow?

A.—Next, the three position switch should be moved to *Down* position and held until the white light comes on. The switch handle may then be released.

1684-Q.—What happens when the switch handle is released?

A.—It will assume the centre position which is normal. The equipment is now cut in and coding.

LOCATING A CIRCUIT FAULT

1685-Q.—Give an example for locating a circuit fault.

A.—To locate such a fault, let us assume that in the 15 vehicle train the application rheostat dial must be set at *12* to obtain a zero reading on the application milliameter.

1686-Q.—What does this indicate?

A.—That the fault lies between the 12th and 13th cars and since it is on the application meter dial, the fault must be in the application wire.

1687-Q.—Where might the fault be in case both rheostats registered 12 cars instead of 15?

A.—The fault might be in both the application and release wires, in the common return, or in all three.

1688-Q.—As previously stated, when a circuit fault occurs, the white light is extinguished and the red light is illuminated, how long does the red light stay lit?

A.—The red light will remain until the cause has been removed and the milliameters rebalanced with the three position switch in the *UP* position.

1689-Q.—What must then be done?

A.—To restore the white light it is then necessary to move the three position switch to the *DOWN* position and extinguish the red light.

1690-Q.—At which other time is such a procedure also required?

A.—When a car is cut in or out of a train enroute.

INSPECTION OF CABINET

1691-Q.—Why is it advisable to inspect the relay cabinet at regular periods?

A.—The cabinet should be inspected at regular intervals to insure that the relay contacts appear to have adequate opening and compression.

1692-Q.—What generally affects the relay contacts to cause them to fail to function properly?

A.—Dirt in the relay cabinet, which should be blown out with a low pressure air stream.

1693-Q.—What attention should be given the rheostats?

A.—The rheostats should be examined occasionally and if the contact blades show signs of considerable wear they should be replaced.

1694-Q.—What additional attention should the rheostats receive?

A.—The rheostat winding, particularly where the contact blade wipes on the wire, should be cleaned occasionally with a cloth saturated with half ether, half alcohol or non-leaded gasoline.

1695-Q.—Is it advisable to use carbon tetrachloride for this purpose?

A.—It is not recommended because of its corrosive on bare materials.

1696-Q.—Is it advisable to apply a lubricant to various parts of the rheostat?

A.—A non-corrosive lubricant such as Lubricano Type MD, should be used in small amounts on the winding and on the shaft and contact surfaces of the connector strip.

1697-Q.—What may be done in the event that the rheostat wires loosen?

A.—Application of an insulating varnish on these wires as an adhesive will remedy this condition.

THE A-2 CIRCUIT TESTER

1698-Q.—Why is it advisable to use a circuit tester?

A.—It is desirable to test the cars prior to the time that the locomotive is available for coupling to the cars. In order to check the integrity of the train line circuits under these conditions, the A-2 Circuit Tester is recommended.

1699-Q.—What is required when using this tester?

A.—All that is required is a yard power source.

ELECTRICAL SECTION

Fundamentals of Flashing of Diesel-Electric Motors and Generators

A summary of the basic causes of flashovers with suggestions for reducing their frequency and minimizing their damaging effect

C. A. Atwell

FLASHING occurs on nearly all diesel-electric locomotive motors and generators. There are several kinds of flashing. All of them occur suddenly and some may develop into flashovers or otherwise damage the machine on which flashing develops. To determine the cause of flashing, rather than flashovers, the Westinghouse Electric Corporation undertook a study of the cause of flashing, the results of which are reported in a paper which was presented at the Midwinter Meeting of the American Institute of Electrical Engineers held in New York, January 18-22, 1954, by C. A. Atwell.

In describing flashing and its causes, Mr. Atwell says that an arc or flash may occur where commutator bars are leaving the trailing edge of the brush. This, occurring suddenly, is certainly a visible flash even if it does not extend to any other part of the machine. Such an arc or flash at the brush edge may appear to be quite severe without producing an actual flashover between brush holders. A flash of light around the commutator commonly known as ring-fire may also occur. Ring-fire is the result of small arcs between one or more pairs of adjacent commutator bars. These arcs between bars are usually formed as the spaces between adjacent bars short circuited by the brush leave the brush, and may continue for several revolutions. In cases of exceptionally high maximum volts per bar resulting from high voltage and a distorted field form, these arcs may form while the bars are between brushes. The apparent continuous ring of fire around the commutator is usually an optical illusion caused by the high peripheral commutator speed while these small arcs exist between certain bars. There also may be a flash or arc from the commutator or brushes to some adjacent grounded part of the machine due to creepage over an insulating surface.

The two most common kinds of flashing are the arcing at the edge of the brush and ring-fire. Neither one of these is usually very destructive in itself, but either one may develop into an arc extending over the surface of the commutator from brush holder to brush holder. This type of flashing is defined as a flashover and can be quite destructive if allowed to continue for even a fraction of a second.

Arcing at the brush edge is due to a current surge and actually is instantaneous bad commutation. Any arcing of this kind creates vaporized conducting material

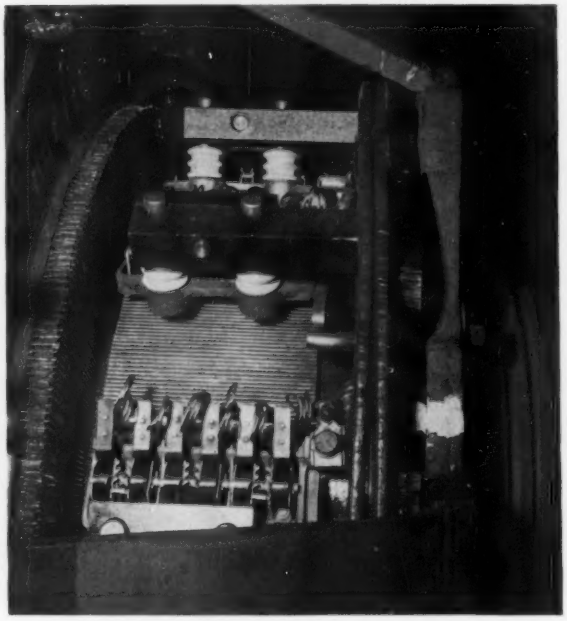


Fig. 1—Brush holder arcing horn and grounding pin arrangement for diesel-electric locomotive generator

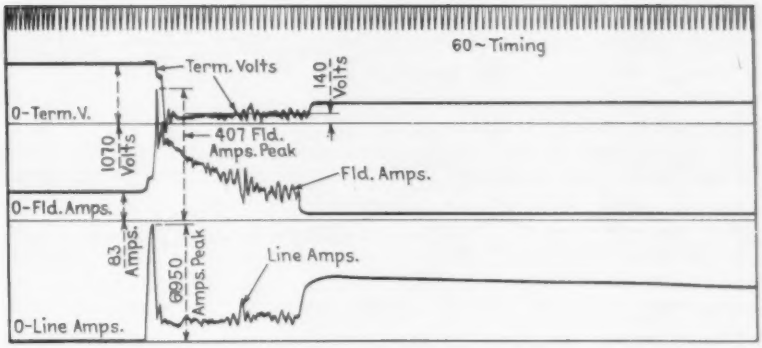
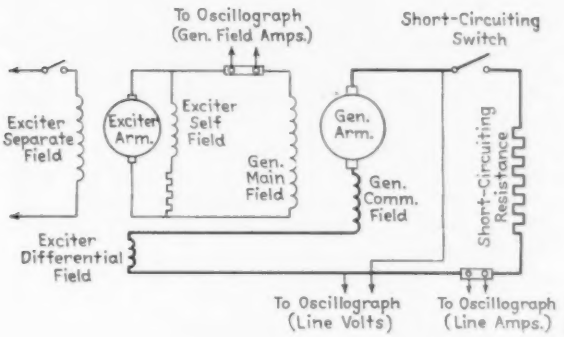


Fig. 2 (right)—Tracing of oscillogram of generator flashover produced by short circuiting through resistance.

Fig. 3 (below)—Schematic diagram of test circuit for producing generator flashovers.



and if the heat of the arc is sufficient to vaporize enough material and ionize the surrounding air, the arc will grow in size and may result in a complete flashover. The instantaneous condition of bad commutation does not mean that the motor or generator is a poor commutating machine. Present-day diesel-electric motors and generators usually have excellent commutating ability over their entire range of operation under steady state conditions. The instantaneous bad commutation which initiates a flashover is due to a sudden surge of armature current. Since there is a time lag in the commutating field magnetic circuit, the voltage induced in the coils short circuited by the brush is not fully compensated for by the commutating field for a short period of time, resulting in instantaneous bad commutation.

The ring-fire kind of flash also may result in a complete flashover by an increase in the number of small arcs between bars until a heavy arc extends from brush holder to brush holder.

Oscillographic analysis of flashovers has proven valuable in determining the current and voltage variations that occur. Such analysis on locomotives in service, however, has not proven very fruitful due to the difficulty of obtaining flashovers when wanted. They seem to occur always at times other than when the oscillograph equipment is set up on the locomotive. Oscillographic analysis has been more profitable on the test floor where the severity of conditions can be increased until flashover does occur.

During the tests, various methods were employed to deliberately cause flashovers. These included opening and closing of circuit breakers, lifting the brushes of one polarity off the commutator, throwing a handful of copper slivers on the commutator, and short-circuiting the main generator through a low resistance with the generator running at full speed and voltage without load.

Results of the latter procedure are shown by the oscillograph record in Fig. 2. Connections used for this test are shown in Fig. 3. There was no overload protection except means for opening the separately-excited exciter field at the beginning of the flash and a circuit breaker in the driving motor circuit.

As will be seen from the oscillogram, the arcing lasted 22 cycles, or 0.37 seconds, which is a long time for a destructive arc to continue. In this case the commutator bar ends were badly beaded, the string band blackened with smoke, and brush holder castings pitted. The speed decrease during the flashover was practically negligible due to the large rotating mass of the driving motor.

Causes of Motor Flashovers

Concerning the reasons for motor flashovers, Mr. Atwell says there are many reported causes of motor flashovers in service, although in many cases more causes than one combine to produce the result. These causes, Mr. Atwell says, can be classified under four general headings: 1. Brush jumping; 2. Commutator ring-fire; 3. Current surges; 4. Bad Commutation.

Brush jumping, the author explains, was a well-known cause of flashovers on street railway motors, particularly on rough track, and on switches and crossovers. This, he says, is often minimized by greatly increasing brush tension, up to as much as 9 lb. per sq. in. Worn or broken brushes and bad commutators may be other causes.

Concerning motor speeds, Mr. Atwell says, running a motor above its maximum allowable speed can put strains on the commutator bar assembly that are likely to produce a rough commutator with resultant brush jumping. The maximum allowable speed of the locomotive with a certain gear ratio is always definitely stated by the manufacturer. If this is 65 m.p.h., for example, any considerable amount of running above that speed is likely to initiate trouble. A locomotive that has a 60 m.p.h. maximum speed is not a 65-m.p.h. locomotive. It should be applied in service where there is a margin between the usual top operating speed and the stated maximum speed.

Causes of ring-fire are listed as follows: metallic particles in commutator slots;

Carbon dust, dirt, oil or water on commutator;

Conducting material on Vee-ring extension;

Conducting material on commutator risers;

String band recently painted and placed in operation before drying;

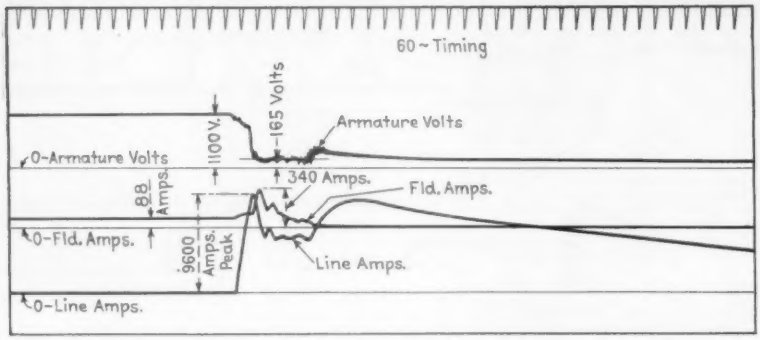


Fig. 4—Tracing of oscillogram of generator flashover produced by short circuit in the same manner as in Fig. 2, but limited to four cycles duration by the impulse relay

Wheel slipping at high speed;

Excessive voltage from generator;

Excessive voltage due to dynamic braking at too high speed;

Defective field shunts causing too much shunting of field current.

Current surges are a prolific cause of flashing and causes of surges are listed as follows:

Loose brush shunts which may cause short circuits to ground.

Brush shunts touching commutator risers.

Too sudden application of dynamic braking at high speed.

Improper operation of automatic transition relays or contactors.

Short circuits or grounds in wiring or windings of motor.

Short circuits or grounds in locomotive wiring external to motors.

Main contactors opening and closing under heavy load.

Loose connections in main circuits.

Rapid change of generator voltage due to loose connections in generator field circuit.

Rapid surging of load regulator.

Rapid surging of engine governor.

Generator Flashovers

On the subject of generator flashovers, Mr. Atwell points out that their causes are in most cases the same as those for motors except that the generators are not subject to impact and unlike motors, generators may have over-voltage due to improper main field setting accompanied by over-speeding due to improper engine governor setting. Standstill burns and flatspots, he says, may be caused during engine starts with a low battery. Accurate brush setting, he adds, is highly important on generators.

The most prolific cause of generator flashovers, Mr. Atwell states, is a large and sudden current surge caused by motor flashover. This is the reason, he says, why many reports read, "Motor slightly flashed, generator heavily flashed." The generator flash will continue and cause severe damage unless means are employed to reduce its voltage and the power input from the engine.

Mr. Atwell then proceeds to list motor and generator design factors affecting flashing. They are not included in this summary, since they cannot be controlled by the operator or maintainer.

Principal among prevention of flashovers, Mr. Atwell says, are avoiding large and sudden current changes and the selection of motor connections that will allow the generator to operate over its most favorable volt-ampere range. A considerable number of flashovers, he states, are caused by improper handling of the transition lever in manual transition. This is a reason for the increasing use of automatic transition, although flashovers may also occur if automatic transition relays and contactors operate improperly.

Sudden and excessive dynamic braking changes can cause every motor on a locomotive to flash over. In motoring operations, the motor current is low when the speed is high. When dynamic braking is applied at high speed, the motor becomes a separately-excited generator, and requires little additional excitation to make it supply both excessive current and voltage. If these excessive values are obtained suddenly, the danger of flashover is increased.

Operating conditions, particularly to be desired are listed by Mr. Atwell as follows:

1. Operation of motors in as strong a field as possible at high speed. This means better commutator condition over a long period of time due to fundamentally better commutation at high speeds. (Sparking volts are proportional to the product of amperes and speed.) The stronger field condition is also fundamentally more stable against flashovers under the conditions that produce brush jumping, ring-fire, or current surges.

2. Operation of generator (and consequently motors) at as low voltage as will obtain the desired performance.

Minimizing Damage Caused by Flashovers

Duration of a flashover is a measure of the damage caused and much has been done to stop them quickly. Among the newest devices for this purpose are a ground relay and a rate-of-rise relay recently developed by Westinghouse. Mr. Atwell describes these relays and their function on a locomotive as follows:

"An improved type of ground relay has been developed which is positive not only in detecting a ground anywhere on the power circuit, but also will detect a flashover on either generator or motor as soon as the arc is grounded. Positive action of the relay is obtained by means of a biased alternating current supplied to the ground relay coil circuit through a small transformer.

"In addition to the biased ground relay protection, an impulse relay has been developed that operates on the rate of rise of the main generator load current. Since a generator flashover is usually preceded by a very sudden

rise of line current, this rise is made to operate the relay. The relay is used to operate the generator main field contactor to insert a relatively high resistance in the main field circuit. This has proven very effective in reducing the duration of a generator flashover."

Figure 4 is a tracing of an oscillogram of a test floor-produced flashover on a generator that shows the effect of using this relay. This flashover was produced by short circuiting the generator at full speed and high voltage in a manner similar to that described per the oscillogram of Fig. 2. The same generator was used in each case. In this case, the short circuiting resistance was much less than in Fig. 2, being only 0.019 ohms as compared with 0.106 for Fig. 2. The flashover started approximately $\frac{1}{60}$ second after the short circuiting switch was closed, as shown by sudden drop in line amperes and armature volts. Although not shown in the oscillogram, the impulse relay operated in less than $\frac{1}{60}$ second to insert resistance in the generator field. The presence of this relatively high resistance in the main field circuit limited the peak of induced field current to a much lower value than shown in the unprotected flashover of Fig. 2. Also, the field amperes reached a low enough value to cause the arc to go out in approximately four cycles of the 60-cycle timing wave as compared to 22 cycles per Fig. 2. This limitation of the peak generator field current limits the flashover damage, so that repeated flashovers can be produced without damage to the extent that would require removal from service.

What Can Be Done About Flashing

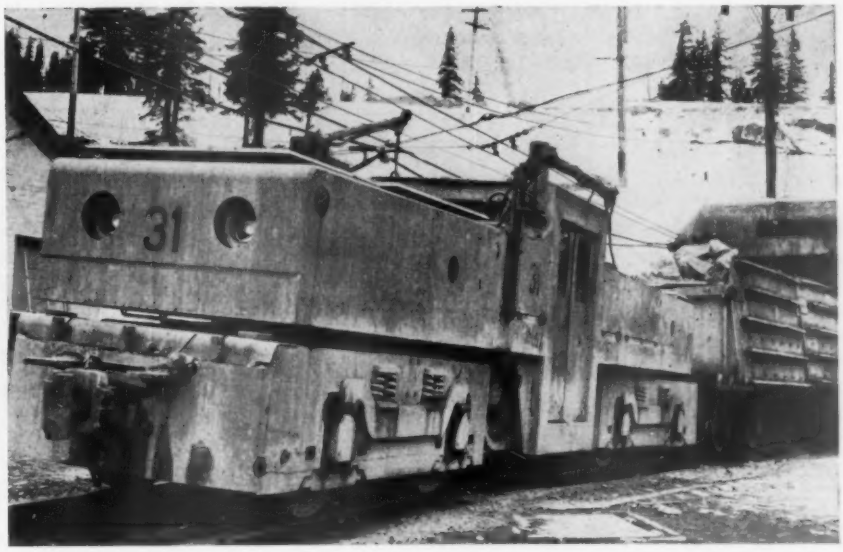
On the general subject of what can be done about flashing, Mr. Atwell says:

"It will probably continue to be an unsettled question as to whether those who manufacture diesel-electric locomotives and their equipment or those who maintain and operate them can do the most to eliminate flashovers. The view one takes of this usually depends on which side of the fence he is. The truth is that both can do more than has been done in the past.

Manufacturers can utilize all of the known factors that will prevent flashing in the fundamental motor, generator, and control designs. They can also incorporate in these designs features which will minimize the effect of flashovers if they do occur. They can arrange the apparatus in the locomotive so that it is accessible for cleaning and adjustment, and is unlikely to become dirty and out of adjustment in short periods of time. They can arrange the ventilation air intakes so that clean air always is supplied to rotating equipment. They can manufacture uniform products so that each machine is as good as any other of the same design. They can supply the operator with thorough instructions as to apparatus construction and the maintenance procedures required. These are admittedly general fundamental statements, but are the goals that should be kept in mind by every one engaged in the manufacture of diesel-electric locomotives or their electrical equipment.

The operators of these locomotives can reduce the number of flashovers first of all by keeping them cleaner. This is a simple and general statement too, but motors, generators, and control apparatus of the power and voltage required on modern road locomotives will always be more subject to flashovers if wet, oily and dirty. The extreme contrast between the state of cleanliness of similar equipment in stationary power houses, and that on the average diesel-electric locomotive is a distinct shock to the layman who sees the comparison for the first time. Operators can instruct their operating and maintenance personnel more thoroughly in the causes of flashovers and maintenance to prevent them. They can assign locomotives to service such that there is a margin between the usual maximum operating speed and the stated locomotive maximum speed. They can make needed repairs promptly.

It is unlikely that flashovers on diesel-electric locomotives can be eliminated entirely. Their frequency can be reduced and the amount of resulting damage minimized by a better understanding and use of the causes and remedies. It is hoped that the information given in this paper will contribute toward that desired result.



20-TON MINE LOCOMOTIVES

The 20-Ton General Electric haulage locomotive shown is one of seven that has enabled the Climax Molybdenum Company to increase their output per train from 20 to 24, 11-ton cars at their Phillipson Level mine at Climax, Colorado, in spite of the 11,500-ft. altitude and winter temperatures as low as 30 deg. below zero. Climax has had no serious maintenance problems with the locomotives even though they are in use 24 hours a day. The overall height of the locomotives is 6 ft. 8 in. They have become popular with operators because the totally enclosed center cab provides greater safety and, with the installed heaters, greater comfort.

New Haven's Ignitron M.U. Cars Near Completion

Propulsion equipment which will take a.c. power from the contact system and supply controlled d.c. power to the motor is now being installed on first of 100 electric motor cars

By E. W. Ames, W. M. Hutchison and V. A. Moore, Jr.

EARLY in 1954, there will be placed in commuter service on the electrified lines of the New York, New Haven and Hartford, the first of a 100 new multiple-unit cars. The outstanding feature is the use of Ignitron rectifiers to convert alternating-current collected from the trolley to direct-current for operation of d.c. traction motors. This is the first application in the world of this type of equipment in quantity. Its use follows naturally from the excellent results which have been obtained with Ignitron rectifier type motive power on a trial multiple-unit car in service on the Pennsylavnia since 1949, followed by four locomotive units (nominally rated 3,000 hp. each) which have been in operation on the same railroad since early in 1952.

This type of equipment, which embodies the advantages of high-voltage a.c. transmission with the superior characteristics of low-voltage d.c. motors, is also well adapted for operation on the New Haven, where the cars operate for 11.76 miles between Grand Central Terminal in New York and Woodlawn, N. Y., over the New York Central tracks, taking energy from the 650-volt d.c. third rail.

Authors are all with Westinghouse Electric Corporation, East Pittsburgh, Pa.

The new cars, built by the Pullman-Standard Car Manufacturing Company at its Worcester, Mass., plant, weigh 81.5 tons without load and seat 120 passengers. Air conditioning and automatic heat control are incorporated to assure passenger comfort in all seasons. In contrast to existing motor cars, which employ hand acceleration and operate with trailers, the new cars are all equipped with four 100-hp. motors and accelerate automatically at a fixed rate of 1.0 m.p.h. per sec., based on an average load of 60 passengers. All-motor-car operation involves a minimum of terminal switching, assures uniform accelerating rates and provides the greatest protection of equipment and schedules in case of failure of one car in a train.

The equipment is capable of operating in either local commuter service or in express service, up to a maximum speed of 80 m.p.h.

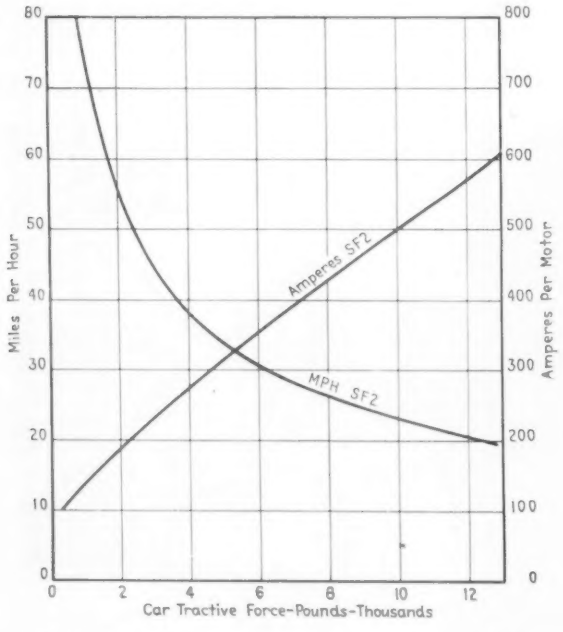


Fig. 1—Car performance curve a.c. zone—six cars per train.

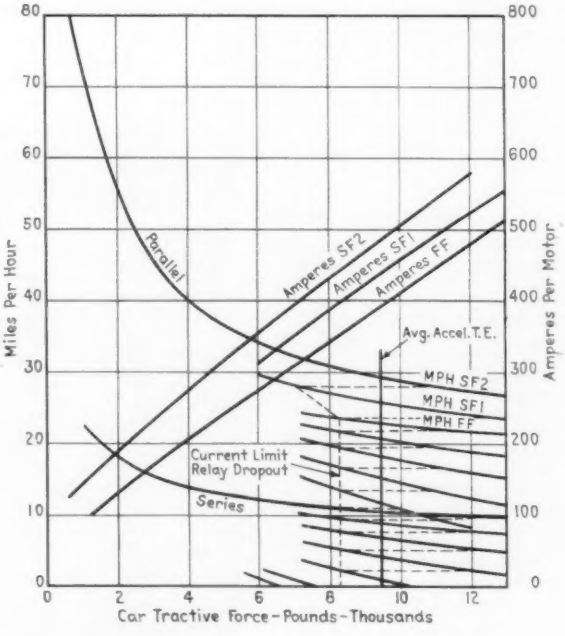


Fig. 2—Notching curve third rail zone 650 volts d.c.

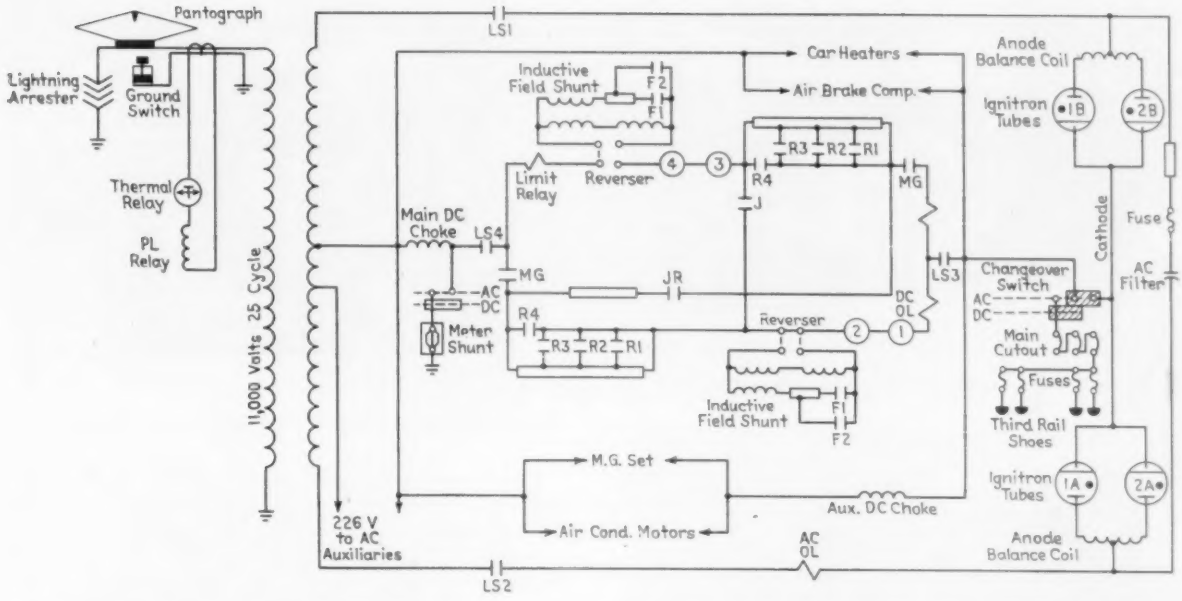


Fig. 3—Schematic diagram. Switches LS1 and LS2 are closed for a.c. operation and open when car is operating from 650-volt d.c. third rail.

Figure 1 illustrates the performance of a typical 6-car train operating from the 11,000-volt a.c. trolley. Figure 2 shows the performance from the 650-volt d.c. third rail.

System of Control

The major portion of the main and auxiliary circuits are the same whether the car is operating in the a.c. or the d.c. zone. Only the power supply differs. In the d.c. zone, the changeover switch connects the traction motor circuits and the d.c. auxiliary circuits between the third rail shoes and ground. In the a.c. zone, the changeover switch connects these same traction motor and auxiliary circuits between the Ignitron tube cathodes and the transformer mid-point through the main d.c. reactor.

In both the a.c. and d.c. zones resistor acceleration with transition is used. Transition is the bridging type similar to that used in a number of previous 650-volt commuter and rapid transit applications. Two steps of field shunting are used. The acceleration is automatic at a fixed rate under the control of a limit relay. Interlock progression type of control is used.

Rectified D.C. Supply

The rectification is accomplished by means of a full wave rectifier connection from single-phase, 25-cycle power. For one-half cycle (Fig. 3), the current is fed from one end of the transformer through the anode balance coil, which assures equal load division, then through tubes *1A* and *2A* to the cathode which is the positive side of the power supply. During the next half cycle, tubes *1B* and *2B* supply the load current. Current is supplied to the traction motors and to the d.c. auxiliary motors in parallel. D.c. chokes are used in both the traction motor and auxiliary circuit. The auxiliary d.c. choke is connected to the positive side of the power supply. The main circuit d.c. choke is connected to the negative side. The d.c. chokes are used to limit the a.c. component of the rectified d.c. to values at which all motors will commutate satisfactorily. The air brake compressor motor and car heaters do not require a d.c. choke to operate from rectified d.c., therefore, they are connected from the cathode to the transformer mid-point. The auxiliary d.c. choke also serves as a fault current surge limiting reactor in the d.c. zone for all d.c. auxiliary motors except the air brake compressor.

Traction Motors

The traction motors are self-ventilated, motors with single reduction gearing and flexible couplings. These motors are 325 volt. d.c., series-wound, commutating pole motors with field control, and insulated for operation two in series on a maximum of 750 volts. The motors are designed for suspension from the truck transom and for coupling by means of gear type couplings to the gear units which are mounted on the axles and supported at the motor side by suspension bolts. These motors are very similar to the motors supplied for rapid transit service in New York City.

Main Circuit Apparatus

The main transformer is an Inerteen-filled 380-kva. transformer with an Inerteen to air heat exchanger. One thousand cu. ft. per min. of air is used for cooling. The transformer is 52¾ in. wide, 29¼ in. high, 94⅜ in. long, and weighs 7,840 lb. The primary winding is 11,000 volts, 25 cycles. The secondary voltage from the mid-point to either end is 780 volts, with one tap brought out at 226 volts from the transformer secondary mid-point for a.c. auxiliary circuits.

The a.c. filter consists of a capacitor and resistor in series connected across the entire transformer secondary to suppress the induced currents in telephone lines adjacent to the electrified lines in the a.c. zone of operation.

The rectifier cubicle (Figs. 4, 5 and 6) has been constructed in the form of the letter *T*. It is 29 in. high, 65

Fig. 4—Ignitron equipment box, rectifier tube compartment.

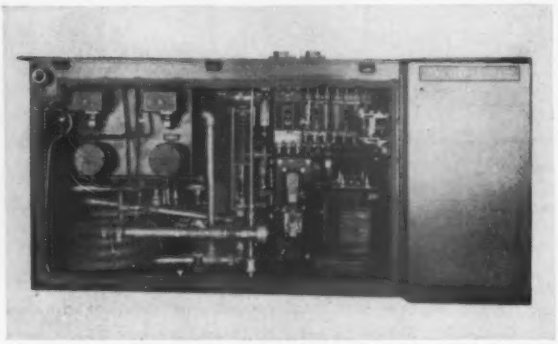


Fig. 5—Ignitron equipment box, regulator compartment.

in. long, and 49 in. at its widest part. Three felt-sealed, lift-off covers are provided for access to maintain equipment. The rectifier cubicle mounts under the car and weighs about 1,880 lb.

Four Ignitron rectifier tubes are mounted on a frame insulated and shock-mounted from the main box construction. The tubes are water-cooled by a closed-circuit cooling system. Insulation to ground is provided by using a 13-ft. rubber hose to the inlet and the discharge header of the rectifier tube frame. The Water system is protected from freezing by anti-freeze. The water temperature is regulated by a temperature-sensing device which controls a three-way valve. The water temperature is held between 108 and 122 deg. F. by the position of the three valve which diverts the water through the radiator for cooling or by-passes the remainder around the radiator to retain the heat in the water.

The valve and regulator are so designed that part of the water may by-pass the radiator so that the temperature of the supply water changes according to the load demand of the rectifier. The water pump and radiator are located externally to the rectifier cubicle. An expansion tank, with immersion-type water heaters, is mounted in the rectifier cubicle. If the water temperature falls below 77 deg. F., the water heaters are turned on automatically. If the water temperature falls below 41 deg. F., the *LS1* and *LS2* switches are held open until the water temperature rises above 41. This is necessary because the rectifier tube is susceptible to surging when operating at low temperatures. At temperatures above 131 deg. F., the rectifier tube is susceptible to arc-back. Thermal relays are mounted on each tube to open *LS1* and *LS2* when the tube jacket temperature reaches 131.

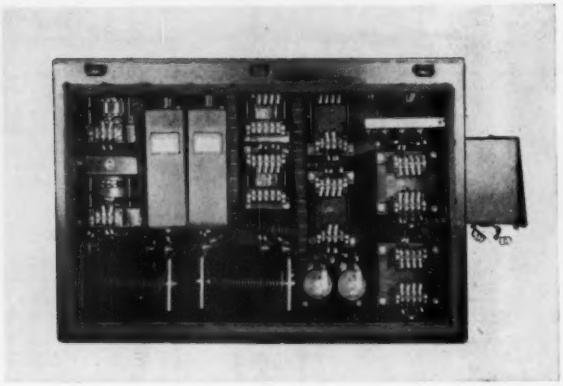


Fig. 6—Ignitron equipment box, excitation circuit compartment.

A low-water pressure switch is mounted on the tube inlet water manifold to open the *LS1* and *LS2* switches if the inlet water pressure falls below 15 lb. Normal pressure is approximately 35 lb. Whenever any of the above conditions are corrected, the *LS1* and *LS2* switches close and re-apply power to the car.

The radiator for cooling the water is located in the transformer and reactor blower air intake. The air temperature is raised approximately 9 deg. F., then utilized in ventilating electrical equipment. The water cooling system is the same as used on the experimental rectifier car which has been in operation over 4½ years, and on the rectifier locomotives which have been in operation over 2 years. It has been found by experience that the water system requires very little maintenance and will operate for a long period of time without trouble.

There are two excitation circuits of the non-linear reactor type located at one end of the rectifier cubicle. The protective breakers for the excitation circuits are located in the cubicle. Misfire lights, one for each tube, have been provided to enable maintenance personnel to check the rectifier operation.

Control Equipment

The major portion of the control equipment is mounted in the main and auxiliary control box. The box contains the electro-pneumatic switches which serve as the a.c. and d.c. line switches, field shunting switches, the switches which short out accelerating resistance steps and those that set up the series and parallel motor combinations. Also mounted in the box are the reverser, a.c.-d.c. changeover switch, operating and protective relays, auxiliary circuit brakers, electromagnetic contactors for the car heaters, indicating lights, and an a.c. and a d.c. watt-hour meter. Figures 7, 8 and 9 show the relative location of the equipment in the main and auxiliary control box.

The reverser and a.c.-d.c. changeover switch are of the drum type, each operated by an air engine through a rack and lever. Each can be thrown manually without removing covers from the box by means of handles extending through the bottom of the box.

The limit relay is a statically-balanced, quick-acting device. It is set to give the desired accelerating current. The setting is not affected by vibration or road shock. Equipment boxes are grounded by being bolted to the car frame.

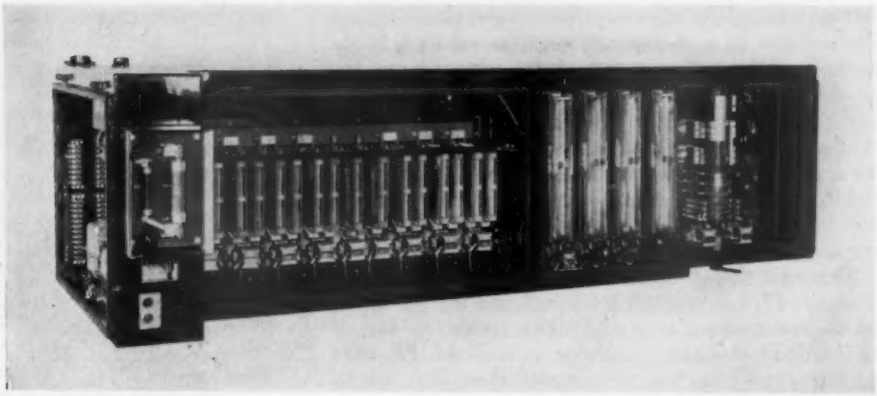


Fig. 7—Main and Auxiliary control box, front view.

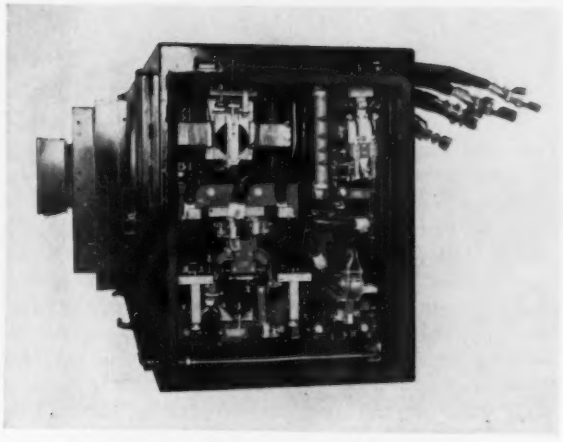


Fig. 8—Main and auxiliary control box, overload relay end.

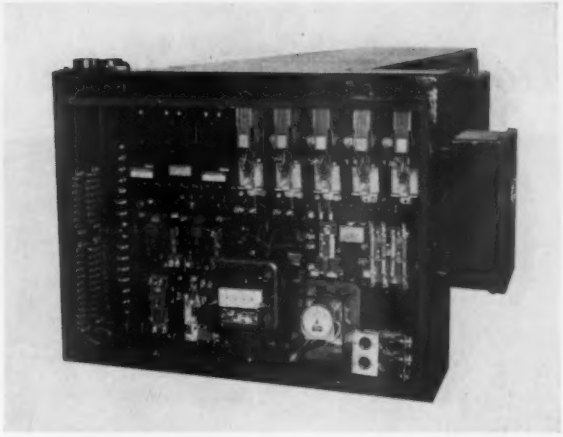


Fig. 9—Main and auxiliary control box, watt-hour meter and contactor end.

Auxiliary Circuit

Direct-current, 650-volt motors fed from either Ignitron power or the third rail are used for all auxiliaries which are required in both the a.c. and d.c. zones. The car heaters are also supplied from Ignitron power or the third rail.

The transformer and reactor blower and the transformer Inerteen pump are required only for a.c. operation. Their motors are capacitor-start, capacitor-run induction motors which are fed from a 226-volt tap on the transformer secondary.

The Ignitron water heaters and anode heaters are fed from the third rail in the d.c. zone and from the 226-volt transformer tap through a 226- to 650-volt insulating transformer in the a.c. zone.

Low voltage d.c. for control, low-voltage auxiliaries and battery charging is supplied from the generator of the motor-generator set.

A ground detector relay panel detects grounds in the transformer secondary, the traction motor, and auxiliary circuits. Operation of the ground detector relay lights an indicating light.

The d.c. overload relay is a combination of two overload relays, a reset relay and a line switch relay. An overload relay is connected in each of the two traction motor circuits.

The operation of either overload relay will open the d.c. line switches. The line switch relay prevents the closing of the d.c. line switches until the reverser is in the position called for by the master controller. The reset relay allows the overload relays to be reset from the master controller. The overload relays can also be reset manually from the pushbutton which extends through the main and auxiliary control box cover.

The a.c. overload relay detects Ignitron tube arc-backs and overloads in the a.c. circuit. Like the d.c. overload relay, it can be either remotely reset from the master controller or manually reset from a pushbutton extending through the box cover.

The a.c. line relay is connected across a section of the transformer secondary. It opens the a.c. line switches on low trolley voltage.

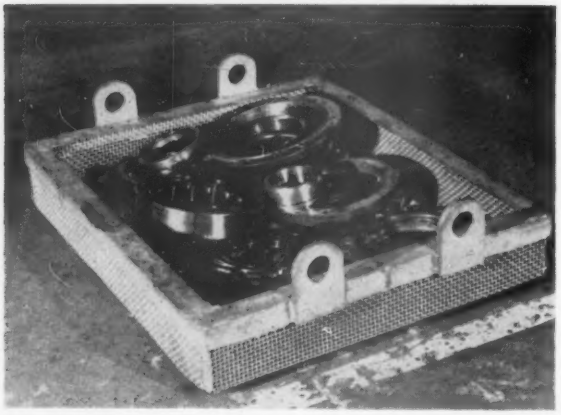
The power-on relay opens the d.c. line switches on low d.c. voltage. The opening of the d.c. line switches causes the accelerating resistor switches to open. When the power-on relay recloses allowing the d.c. line switches to reclose, all the accelerating resistance is in series with the traction motors and the normal accelerating sequence begins. In this way the power-on relay allows the traction motors to come on the line in series with accelerating resistance after a third rail gap.

The d.c. line relay keeps the a.c.-d.c. changeover switch in the d.c. position as long as there is voltage on the third rail shoes.

The transformer thermal relay is energized through the contacts of a thermostat which is emersed in the Inerteen of the main transformer. When the temperature reaches 185 deg. F., the thermostat contacts close and energize the transformer thermal relay. The closing of this relay opens the d.c. line switches, thus removing all traction load from the transformer. The relay also lights an indicating light located in the control box and one located in the car vestibule. The relay is reset from a pushbutton in the control box.

The main transformer receives additional protection from the *PL* (pantograph lowering) and thermal relays which are mounted in a small box inside the car. If an overload of large magnitude occurs, the *PL* relay operates and energizes the magnet valve that admits air to the pantograph ground switch. The resulting high trolley current trips the substation breaker and clears the line. When power is removed, the *PL* relay goes to the position that energizes the Pantograph Down magnet valve. This lowers the pantograph on the car that is in trouble. The *PL* relay latches itself in this position. The operator cannot raise the pantograph. An overload below the *PL* relay setting, but high enough to damage the main transformer if it persists too long, causes the thermal relay to operate. This energizes the magnet valve that admits air to the pantograph ground switch. As shown in Fig. 3, the ground switch current passes through the current transformer supplying the *PL* relay. Being a high speed device, the *PL* relay operates before the substation breaker clears the line. When power is removed, the pantograph is lowered by the *PL* relay.

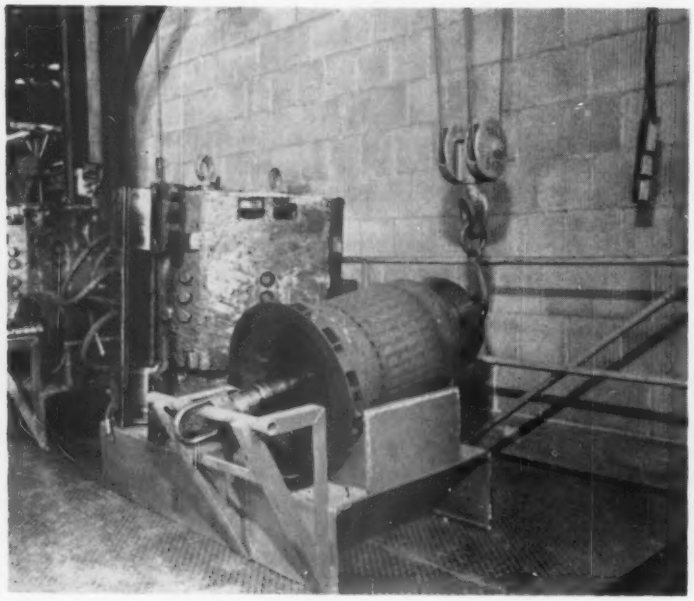
Do Degreasers Affect Insulating Varnish?



Two questions are invariably asked by prospective users of vapor degreasers for electrical shops. They are: Do they affect insulating varnish? And, how can tank corrosion by hydrochloric acid be avoided?

In its Dale Street shops at St. Paul, Minn., the Great Northern has a gas-fired Phillips degreaser 8 ft. square by 12 ft. deep, with a burner capacity of 650,000 B.t.u. per hour. It is equipped with a condenser two feet from the lip of the tank, and with a lip exhauster. The cleaning agent is perchlorethylene. Tests made with a halide test meter while the degreaser was in operation showed less than 15 parts per million in air of degreasing room.

Left:—Tray filled with bearings and housings removed from the skid rack. Good condition of the protective varnish on the tray after four years is evident.



Left: Skid used for transporting motor armatures and frames is equipped with a tip-up device for picking up armatures.

Right: Interior of the degreaser tank just after being coated with zinc.

The degreaser with a traction motor armature, ready for immersion.

The degreaser is used for cleaning all electrical equipment and miscellaneous engine parts. It is practice to limit the immersion of armatures in the gas to 5 minutes and field frames to 15 minutes. Cleaned parts are rinsed with liquid, care being taken to hold the nozzle below the vapor line to avoid stirring the vapor and to prevent loss of vapor.

Skid rack and tray on a lift truck loaded with parts for the degreaser.

A special skid rack, shown in the illustrations, is used for handling small motor parts in the degreaser and for transporting them in the shop. The basket which fits the upper section of the rack is removable although both rack and basket are immersed as a unit when degreasing. To prevent their corrosion, it was first thought to have them zinc coated. Experiments showed, however, that this is unnecessary. Racks and trays are spray-painted with Sterling M 472 clear baking varnish mixed with aluminum powder and baked. After four years use the varnish on these trays and baskets shows no deterioration.

Perchlorethylene with water produces hydrochloric acid which attacks the metal of the tank. To protect the steel tank from corrosion, it is coated with zinc about once in four years. Before coating, the interior of the tank is first sand-blasted and then metallized with zinc wire. A coating of 0.010 in. is applied. This practice has prevented any serious damage to the tank.

Electronic Stethescope as a Shop Tool

The Pennsylvania has tried out electronic stethescopes in a number of its diesel-electric locomotive maintenance terminals. The instruments have been used to determine if traction motor bearing noises incurred at low speeds will indicate when removal and examination of bearings is necessary. An investigation which included a number of shops developed the following information:

When a grating sound in a bearing is detected with the stethescope, it is usually found upon dismantling the bearing, that the bearing is actually defective.

A bearing with shelled out spots on either the rollers or races can readily be detected.

A noisy bearing caused by wear in the cage, abnormal lateral caused by retaining nuts working loose, or improper mounting can be detected after a short training period.

Cracked or broken bearings give a decided clicking sound.

The instrument is subject to outside influence, such as moving locomotives or cars into the shop in close proximity to the motor testing area. Diesel engine noise is a little difficult to keep out of the head set, and interferes with the sound coming from the rotating bearing, but it requires very little time for the operator to become familiar with the various sounds, which indicate excessive friction, breaks in rods or shafts, shelled out sections of bearing races, or loose and worn parts, etc.

While experience with this device has been limited, the results obtained to date show that of 361 traction motors (722 bearings) inspected, 38 defective bearings were indicated. Of this number, 31 were found, after detail inspection, to be unsuitable for further use.

It is concluded from this experience that the device is sufficiently accurate to merit consideration for any shop working on equipment with enclosed moving parts as a desirable facility for the general improvement of maintenance procedure.

Excitement in the Wrong Place

The field fuse was sawed in two to see if there was any unusual condition within the fuse

By Gordon Taylor

THIS case deals with a main generator that needed to be excited, and a crew that was apparently over-excited. At least, the crew was confused.

A three-unit E.M.D. locomotive had one of its trailing units drop its load for apparently no good reason. The engine was operating at full speed and responded to the throttle, so it was not a case of engine trouble.

There had been no ground relay action and the appearance of the generator was okay, so there was no reason to suspect the trouble was due to some part of the generator needing repair.

The crew thought there must be a defective fuse involved and, according to reports, tested several fuses, including the battery field fuse (80 amp.), but found nothing wrong.

After considerable delay in testing, the locomotive proceeded with reduced tonnage to a small repair point, where the fuses were again tested and reported to be good. The crew then decided that just for luck they would trade out the 80-amp. field fuse to see what would happen. When this was done, the generator immediately picked up its load and the locomotive was back in business.

The field fuse involved was sent in to Springfield for examination, where it was tested and found blown. The fuse shell was then sawed in two to see if there was any unusual condition within the fuse.

This article and the following one are based on actual experiences of men who operate and maintain diesel-electric locomotives.

Lesson to Be Learned

Before a generator can develop power, it must have its field excited. This is done by passing current from the battery, through the battery field winding on the generator.

There are several field windings in the main generator. They are all important, but the battery field must be working if the generator is to pick up its load.

The generator field must be excited, but right there is where the excitement should stop. If the crew will familiarize themselves with the equipment, there will be no reason for them to become excited.

The following suggestions should help in cases where the engine does not load. If the engines of one or more units speed up, but fail to load properly, check for:

1. Shunt field contactor open. If the generator shunt field contactor does not close on one unit, the cause may be: a. Isolation switch not fully in *Run* position; b. Either or both starting contactors stuck, closed or interlocks open or dirty; c. Ground protective relay tripped; d. Parallel relay contacts open or dirty; e. *P-3* contactor open or dirty; f. *S-14* or *S-23* contactor open or dirty; g. Either wheel slip relay closed; h. Defective 35-ohm resistor.

2. Battery field contactor open. If the battery field contactor does not close, then check the operation of the shunt field contactors. If they are open, check causes as outlined for shunt field contactor.

If the shunt field contactors are closed, then check the contactor interlocks which complete the battery field contactor operating circuit. You see the shunt field contactors make it possible for the battery field contactor to close after the shunt field circuit has been set up.

3. Next check the battery field fuse to see if it has blown.

4. Another possibility is that either wheel slip relay may have picked up and stuck in the closed position. If this condition exists, the wheel slip indicator light will show in the operating cab.

5. See that the *P*, *S*, and *M* contactors are in the position corresponding to the transition lever setting. If all the line contactors are out, check the position of the reverser drum; and also check the control air.

6. Starting contactors may be stuck closed or interlocks may not be making proper contact.

7. Sometimes lack of power will be caused by low excitement of main generators due to a faulty auxiliary generator or voltage regulator.

8. Another possible cause is a poor connection in the main generator battery field circuit, which includes the

load regulator. An open circuit in the load regulator will, of course, give the same result as a blown battery field fuse.

Luckily, most of the generator field circuit troubles are due to blown fuses, or dirty interlocks in the circuit, which set up the battery field contactor. The road foremen can make all of this clear to the operating crews.

Remember the main generator fields must be excited, the shunt field and the battery field. These coils provide the magnetic lines of force which the armature coils must cut in order to generate the current that energizes the traction motors.

It may interest you to know that an armature conductor must cut 100,000,000 lines of force a second to generate one volt. So you can see that "to generate" power to haul a mile of box cars, the generator must be excited. But, let the excitement stop right there. An excited crew can cause more trouble than an under-excited generator.

The Diesel That Fooled the Crew

THIS is a case that should never have happened. Its cause has been discussed so many times that it would seem certain that every engine crew would recognize it immediately. A three-unit freight diesel was going about its business, when the two rear units laid down on the job by failing to load up.

Now when two trailing units suddenly develop the same kind of trouble at the same time, there is usually just one answer, and I expect you have guessed it. You are right! It was another case of a defective jumper cable between the lead unit and the next trailing unit.

In this case, the crew struggled along with the two lazy units and lost nearly an hour's time.

When the locomotive reached the first terminal, a maintainer immediately recognized the cause and applied the spare jumper cable. The trailing units went to work and the locomotive was back in business.

Here is a case where the locomotive was doing its best to tell the crew what was wrong. For some reason, the crew failed to understand what the locomotive was saying.

Jumper cable troubles are sometimes difficult, but this case represents about the most simple trouble that can be experienced, especially when all trailing units develop the same kind of trouble at the same time.

When that happens, check and replace the jumper cable between leading unit that is operating properly, and the first trailing unit that has failed. If every one understands this case, there should be no more failures from this source.

Device Applies or Removes Motor Connections

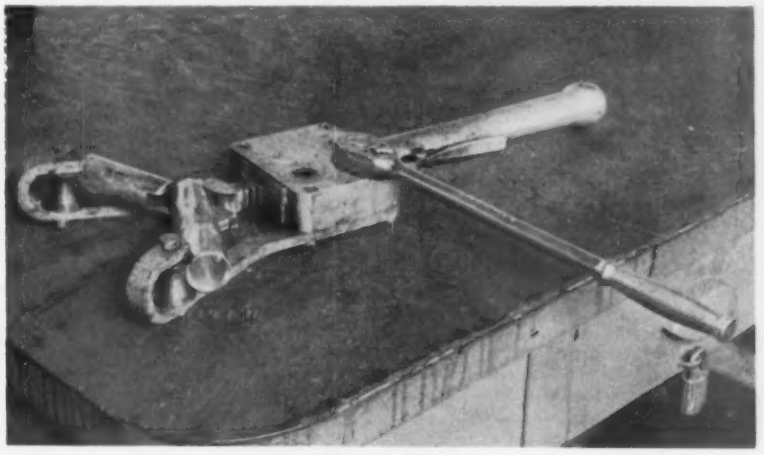
The knuckle-joint connectors used in the traction motor leads under a diesel-electric locomotive are often difficult to open and to close. The difficulty is greatly increased when the edges of the connectors have been battered by a hammer.

A device for performing this operation easily without damage to the connectors developed in the Southern shops at Spencer, N. C., is shown in the illustration. When a connector is to be closed, it is placed with its ends as shown against the two fixed rollers. The movable center piece is a rack which slides out on a ratchet. It is pulled out of the handle until its grooved end is against the center of the connector.

A ratchet wrench handle is then fitted to either one of two square sockets in the center section of the devices. Rotation or pumping of the handle forces the center piece out and closes the connector. Squeezing the trigger on the handle releases the ratchet and a spring pulls the center rack or pusher back into the handle. To open a connector, the same operation is performed on the other side of the connector.

There are two sets of gears in the center section of the device. When the wrench handle is fitted in one position, a pull of 100 lb. on the handle produces a force of 2,000 lb. on the connectors. When fitted in the other position, a 100-lb. pull on the handle will produce a force of 4,000 lb.

The device was developed and made by J. C. Bailey, electrician, Southern, Spencer, N. C.



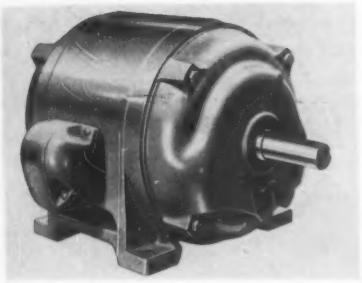
A knuckle joint in the jaws of the device ready for closing.

NEW DEVICES

Electrical Potting Compound

A new sealing compound for electrical connectors, potheads, conduit and conduit fittings is being produced by Minnesota Mining and Manufacturing Company, 411 Piquette Avenue, Detroit 2, Mich. Known as EC-1120-PC, the compound is a two-part synthetic rubber material. It has high dielectric strength and serves to make connectors vibration- and moisture-proof. Applied in liquid form, it will chemically cure to a solid in 24 hr. at 75 deg. F.

Electrical wiring connectors sealed with the compound are protected against attack by moisture, oils, fungus and salt air corrosion. The sealer remains flexible through a temperature range of —65 deg. F. to 200 Deg. F., thus affording protection against wire breaks and adheres firmly to the sides and bottom of the connector. After mixing, it may be poured directly into the unit to be sealed, or by means of a pressure sealing gun, fitted with an appropriate application tip. In the field, a polyethylene bag makes a good application tool.

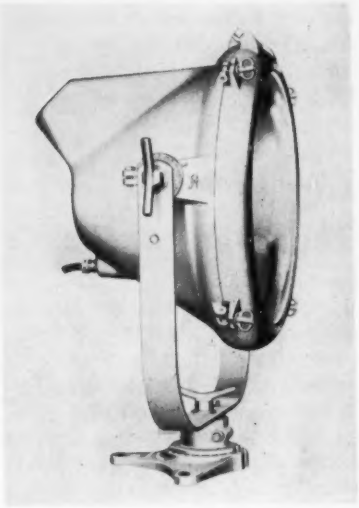


Improved A.C. Motor

An a.c. electric motor which incorporates a number of new features and which conforms with N.E.M.A. specifications is announced by U. S. Electrical Motors Inc., Los Angeles, Cal. By increasing precision of manufacturing processes, holding tolerances to closer limits and improving the electrical characteristics, the motor, designated as Uniclosed, Type H, is more compact than previous models. It is of drip-proof design and also offers splash-proof protection without increased cost. The frame is solid, one-piece cast iron and the stator is prewound. Frame sizes 182-184 are now available. By utilizing the interior space to better advantage, the motor is built more compactly so that the same horsepower can be embodied in less space. The end brackets are entirely new design with air intakes so arranged as to prevent intrusion of water, yet allow liberal air flow into the motor for two-way ventilation. Baffles of a new design within the air vestibules of the end brackets prevent splashings from entering and coming in contact with windings.

The motor in its various ratings meets the same standards as its former type in temperature rise, torque, etc. Overload capacity has not been reduced. The slot design of the laminations has been improved and the asbestos-protected windings, have been reinforced and strengthened by the addition of Mylar laminations. Another feature is the split dome, cast iron terminal box which makes the leads more accessible. A stainless steel data plate set above the box presents a rust-proof surface with legible enduring instructions. Air impeller blades on the rotor ends have been redesigned with curved edges to permit more quiet operation. All castings are normalized. Lubriflush lubrication of the bearings provides means of replacing old grease with new without the necessity of disassembling the motor or disturbing the bearings. The air intake is so designed to avoid pickup of dirt and dust from the floor.

■



Floodlight for Incandescent or Mercury Lamps

The Pyle-National Company, Chicago, announces the addition of a 20-in. floodlight, designated type 20175, to its line of enclosed, weather-tight, dirt-tight floodlights.

The unit is designed to burn 1,000-watt G-40, 1,500-watt G-48, and the 1,500-watt PS-52 lamps which have special burning positions recommended by the lamp manufacturers. The floodlight will also take the 750 and 1,000-watt PS-52 lamps and 700 and 1,000-watt mercury vapor lamps.

The floodlight is fully enclosed and constructed throughout of rugged, corrosion-proof materials. Door and glass joints have a tight, soft packing seal which keeps moisture and dirt from reflector, lamp and inside of lens thereby preserving the beam efficiency, with a minimum of maintenance expense.

The full 360-deg. vertical and horizontal body adjustments are provided with a sturdy locking device to avoid any chance of accidental movement. A register, which is part of the locking device, provides accurate return of the projector to its original adjustment, if it is necessary to tilt it or turn it for relamping or cleaning. In addition, there are angle degree markings to aid in making the original setting meet specifications of the lighting layout. The unit is supplied with a wide choice of door lenses and mounting bases.

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NEWS

Eisenhower Revokes 1952 Retirement Order

President Eisenhower has revoked an executive order issued by President Roosevelt in 1942 to exempt from the compulsory-retirement-at-70 rule all Presidential appointees who were then serving indefinite terms. The revocation becomes effective March 31. Allyn C. Breed, assistant director and former acting director of the Bureau of Locomotive Inspection, is one of the few government employees still continuing in service pursuant to the 1942 order.

A.A.R. Meetings Cancelled

The 1954 annual meetings of divisions and sections under jurisdiction of the Operating and Maintenance Department of the Association of American Railroads have been cancelled.

The cancellation actions were pursuant to a directive issued by A.A.R. Vice-President R. G. May. Mr. May's notice to division and section officers indicated that the matter might be reopened later if the economic outlook then seems to warrant reconsideration.

Among the meetings canceled were those scheduled for this year by the Mechanical Division and Electrical Section. The order does not affect the Engineering Division.

Not yet determined is the fate of meetings scheduled for next September by the Coordinated Mechanical Associations, which include the Air Brake Association; Car Department Officers' Association; Locomotive Maintenance Officers' Association; Master Boiler Makers' Association; and Railway Fuel and Traveling Engineers' Association.

Mechanical Division Reports To Be Acted On

A circular letter issued by the Mechanical Division states that, in the absence of the annual meeting, committees of the division will prepare annual reports in the usual manner for consideration at a meeting of the General Committee, probably on June 29 and, if necessary, on June 30. The General Committee will review all of the reports and decide which recommendations shall be submitted to letter ballot vote of the members, also what other items of interest shall be passed on as information.

As in 1938 when no annual meeting of the Mechanical Division was held, a combined report of the General Committee and a letter ballot circular will be printed and distributed as soon as practicable after the General Committee meeting in June. This procedure is in accordance with Sec. 4 (b) of the Rules Of Order of the Mechanical Division which provides that "The General Committee shall exercise such supervision over the standards, recommended practice, or rules of this Division as may be necessary to meet any emergency that may arise during the year in the conduct of the affairs of the Division."

With no annual meeting of the Mechanical Division in 1954, there will be no published proceedings, but committee reports in abbreviated form and other related data handled during this year will be included in the next subsequent proceedings.

Appliance Rules Have Own Adapter

A device of the "not-otherwise-indexed-by-name" type, which is so useful to tariff makers, has also fitted the Interstate Commerce Commission's safety appliance rules with built-in adaptability to new rolling-stock.

This was pointed up in an address which the director of the commission's Bureau of Safety, S. N. Mills, made recently before the Southern and Southwestern Railway Club at Atlanta.

The Adapter—The commission's March 13, 1911, order, prescribing the appliance rules, included a still-effective provision of the "N.O.I.B.N." type which reads as follows: "Cars of construction not covered specifically in the foregoing sections . . . shall have, as nearly as possible, the same complement of handholds, sill-steps, ladders, hand-brakes and running-boards as are required for cars of the nearest approximate type."

"In recent years," Director Mills said, "this paragraph has proved to be one of the most important provisions of the order. It has made possible, without delay and the formality of numerous proceedings before

ORDERS AND INQUIRIES FOR NEW EQUIPMENT PLACED SINCE THE CLOSING OF THE FEBRUARY ISSUE

Diesel-Electric Locomotive Orders

Road	*No. of units*	*Horsepower*	*Service*	*Builder*
Chicago & North Western	15	.....	General purpose	Electro-Motive
	2	600	Switchers	Electro-Motive
	10	1,600	Switchers	Fairbanks, Morse
	7	1,600	Road switchers	American Locomotive
	3	1,200	Switchers	Baldwin-Lima-Hamilton
Illinois Central	48	1,750	General purpose	Electro-Motive
	2	2,400	Passenger	Electro-Motive
New York, Chicago & St. Louis	23	1,600[1]	Road switchers	American Locomotive
	2	1,600[1]	All-service switchers	Baldwin-Lima-Hamilton

Freight-Car Orders

Road	*No. of cars*	*Type of car*	*Builder*
Canadian National:			
Grand Trunk Western	100	50-ton refrigerator	Pacific Car & Fdry.
Central Vermont	1	50-ton air-drump	Magor Car
Atlanta & St. Andrews Bay	26[2]	50-ton pulpwood	Company shops
Chicago & North Western	25[3]	Caboose	International Railway Car
Chicago, Rock Island & Pacific	100[4]	50-ton box	Pullman-Standard
	100[4]	70-ton covered hopper	Pullman-Standard
Denver & Rio Grande Western	10[5]	Cabooses	Company shops
Great Northern	15[6]	50-ton box	Pullman-Standard
Lehigh Valley	100	70-ton covered hopper	Company shops
	1	125-ton depressed center flat	Company shops
Missouri Illinois	100[7]	70-ton covered hopper	Company shops
New York Central	2,500[8]	Box	Despatch shops
Union Tank Car Co.	850	50-ton tank	Company shops

Passenger-Car Orders

Road	*No. of cars*	*Type of car*	*Builder*
Great Northern	20[9]	Dome	Budd

[1] Estimated cost of the 25 units, $3,737,171.
[2] Cost, $252,000. Deliveries to be completed by May 1.
[3] For delivery this year.
[4] Box cars delivered in February. Hopper cars to be delivered in April or May.
[5] Cost, $125,000.
[6] Delivered in February. Cars have suchion underframes.
[7] To be built during third quarter of 1954.
[8] 2,000 to be wood lined; 500 to have perforated steel linings. Delivery to be completed early next year.
[9] Delivery of this $5,500,000 order scheduled for the beginning of the vacation travel season in June 1955. Four cars will be placed in each of the five "Empire Builder" train sets which provide daily service between Chicago and Seattle and Portland. Nine of the cars in each set will be dome coaches, seating 44 passengers on the lower level and 24 in the dome compartment. The fourth will be for sleeping-car passengers, with a full-length upper level accommodating 77 passengers in chair and lounge seats. An additional lounging section seating 34 passengers will be located on the lower level. Two additional cars are extras.

Notes:

Central of New Jersey.—The Jersey Central in connection with its plans to operate improved and entirely new passenger service for all communities between New York City and Hampton, N. J. with coordinated service to Newark, N. J., expects to invest over $2,250,000 in new rolling stock and facilities. If the proposed new schedules are authorized by the Public Utilities Commission of New Jersey, E. T. Moore, president of the J. C., has said that "the remaining steam locomotives still in passenger service would have to be replaced with diesels and that seven new diesels of much greater horsepower than any the road now owns would have to be bought."

the commission, the development of applications of safety appliances to the various types of equipment which have come into service since the date of the original order and particularly during the past 15 or 20 years, such as diesel-electric locomotives, streamlined passenger-train cars and freight cars of special design for transporting certain commodities."

AIR-BRAKE RULES—Mr. Mills also discussed the development of air brakes and commission requirements in connection therewith. There he noted that the commission did not issue its AB brake order until the Association of American Railroads' undertaking to get interchange cars so equipped had been under way 10 years. "The final completion date under present orders," Mr. Mills added, "is December 31, 1954, or more than 20 years after the original adoption of this type brake as standard."

Summing up, Mr. Mills asserted that "neither the law nor orders of the commission have required the use of anything that is new." All appliances which are required "were developed in railroad service and were in more or less general use before there was any requirement of law that they must be used," the director added.

Satco-Lined Journal-Bearings Reduce Hot Boxes

According to a circular letter recently issued by the A.A.R. Mechanical Division, the Santa Fe started in August 1952 to equip 1,000 refrigerator cars with journal bearings lined with Satco metal and now reports such promising results in reduction of hot boxes that the railway wishes to extend the use of this type of bearing to all refrigerator cars. The cars will be equipped as they become due for repacking under the provisions of Interchange Rule 66 by the car owner.

For purposes of identification, the journal box lids are being stencilled with the letter *S*, 2 in. high on each box lid with white paint and the journal bearing itself is stencilled on the outer end of the brass with the letter *S*, ¾ in. above the bearing surface. It is requested that reports or comments on the operation of cars thus equipped be sent to the engineer of tests, Santa Fe, Topeka, Kan.

Locomotive Units Installed in 1953

CLASS I railroads installed 2,110 new locomotive units in 1953, compared with 3,065 in 1952, the Association of American Railroads has announced. Installations last year included 2,091 diesel units and 15 steam and four gas turbine-electric locomotives, compared with 1952 installations of 3,038 diesel units and 19 steam, two electric and six gas turbine-electric locomotives.

On January 1, Class I railroads had on order 571 new locomotive units, including 546 diesel units and 10 electric and 15 gas turbine-electric locomotives, compared with 958 units on order one year earlier, which included 914 diesel units and 15 steam, 10 electric and 19 gas turbine-electric locomotives.

Bureau of Safety Fiscal Report

THE 33-page report prepared by S. N. Mills, director of the Bureau of Safety, I.C.C., which was released late in January, lists the following results from inspection of motive power and rolling stock for the year ended June 30, 1953:

During the year, 1,253,590 freight cars, 38,115 passenger-train cars, and 14,303 locomotives were inspected, compared with 1,185,675 freight cars, 29,079 passenger-train cars and 13,184 locomotives in fiscal 1952. Of the 1953 total, 3.68 per cent of the freight cars, 3.41 per cent of the passenger-train cars and 1.97 per cent of the locomotives were found to be defective, compared with respective 1952 figures of 3.67, 3.76 and 2.5 per cents.

Air brakes tested on 2,754 trains (consisting of 121,710 cars) prepared for departure from terminals were found operative on 121,568 cars, or 99 per cent. This percentage was attained, however, after 2,500 cars having defective brakes were set out, and repairs made to brakes on 2,158 cars remaining in the trains.

Similar tests on 1,386 trains arriving at terminals with 76,839 cars showed that air brakes were operative on 75,488 cars, or 98.2 per cent. Approximately one car per train was not controlled by power brakes.

In the matter of geared hand brakes, the report noted that certificates of approval issued by the Association of American Railroads are currently in effect for 33 types—21 vertical wheel types, nine horizontal wheel types and three lever types.

SELECTED MOTIVE POWER AND CAR PERFORMANCE STATISTICS

FREIGHT SERVICE (DATA FROM I.C.C. M-211 AND M-240)

Item No.		Month of October 1953	Month of October 1952	10 months ended with October 1953	10 months ended with October 1952
3	Road locomotive miles (000) (M-211):				
3-05	Total, steam	12,186	17,554	124,166	172,335
3-06	Total, Diesel-electric	33,184	30,159	312,553	272,242
3-07	Total, electric	732	771	7,305	7,570
3-04	Total, locomotive-miles	46,187	48,541	444,701	452,476
4	Car-miles (000,000) (M-211):				
4-03	Loaded, total	1,776	1,834	16,758	16,496
4-06	Empty, total	964	938	9,177	8,914
6	Gross ton-miles-cars, contents and cabooses (000,000) (M-211):				
6-01	Total in coal-burning steam locomotive trains	23,086	29,519	225,675	303,507
6-02	Total in oil-burning steam locomotive trains	6,130	9,739	60,290	84,208
6-03	Total in Diesel-electric locomotive trains	93,505	85,272	875,186	756,765
6-04	Total in electric locomotive trains	2,107	2,069	20,706	20,931
6-06	Total in all trains	125,117	126,789	1,184,107	1,166,584
10	Averages per train-mile (excluding light trains) (M-211):				
10-01	Locomot ve-miles (principal and helper)	1.03	1.03	1.03	1.03
10-02	Loaded freight car-miles	41.60	41.30	40.80	39.90
10-03	Empty freight car-miles	22.60	21.10	22.40	21.60
10-04	Total freight car-miles (excluding caboose)	64.20	62.40	63.20	61.50
10-05	Gross ton-miles (excluding locomotive and tender)	2,932	2,854	2,887	2,823
10-06	Net ton-miles	1,342	1,107	1,315	1,299
12	Net ton-miles per loaded car-mile (M-211)	32.20	31.70	32.20	32.50
13	Car-mile ratios (M-211):				
13-03	Per cent loaded of total freight car-miles	64.80	66.20	64.60	64.90
14	Averages per train hour (M-211):				
14-01	Train miles	18.00	17.40	18.10	17.50
14-02	Gross ton-miles (excluding locomotive and tender)	52,102	48,943	51,766	48,935
14	Car-miles per freight car day (M-240):				
14-01	Serviceable	47.50	48.00	45.90	44.90
14-02	All	45.20	45.70	43.70	42.60
15	Average net ton-miles per freight car-day (M-240)	945	957	908	901
17	Per cent of home cars of total freight cars on the line (M-240)	44.80	41.10	46.10	43.50

PASSENGER SERVICE (DATA FROM I. C. C. M-213)

3	Road motive-power miles (000):				
3-05	Steam	3,151	5,699	42,421	68,051
3-06	Diesel-electric	20,746	19,358	201,821	186,178
3-07	Electric	1,475	1,584	15,279	16,188
3-04	Total	25,372	26,641	259,520	170,425
4	Passenger-train car-miles (000):				
4-08	Total in all locomotive-propelled trains	254,532	265,788	2,620,632	2,698,079
4-09	Total in coal-burning steam locomotive trains	16,095	30,636	236,004	351,767
4-10	Total in oil-burning steam locomotive trains	11,996	21,143	147,420	250,867
4-11	Total in Diesel-electric locomotive trains	209,989	196,051	2,067,639	1,915,960
12	Total car-miles per train-miles	9.64	9.67	9.77	9.75

YARD SERVICE (DATA FROM I.C.C. M-215)

1	Freight yard switching locomotive-hours (000):				
1-01	Steam, coal-burning	599	815	5,979	8,056
1-02	Steam, oil-burning	89	177	1,069	1,666
1-03	Diesel-electric[1]	3,599	3,498	34,505	31,524
1-06	Total	4,305	4,514	41,750	41,482
2	Passenger yard switching hours (000):				
2-01	Steam, coal-burning	18	24	201	275
2-02	Steam-oil-burning	6	10	65	107
2-03	Diesel-electric[1]	258	260	2,560	2,555
2-06	Total	314	327	3,148	3,269
3	Hours per yard locomotive-day:				
3-01	Steam	7.30	7.70	6.90	7.06
3-02	Diesel-electric	16.30	16.90	16.30	16.10
3-05	Serviceable	15.20	15.20	15.00	14.30
3-06	All locomotives (serviceable, unserviceable and stored)	13.60	13.40	13.20	12.40
4	Yard and train-switching locomotive-miles per 100 loaded freight car-miles	1.69	1.71	1.72	1.74
5	Yard and train-switching locomotive-miles per 100 passenger train car-miles (with locomotives)	0.76	0.76	0.74	0.75

[1]Excludes B and trailing A units.

SUPPLY TRADE NOTES

CANADIAN CAR & FOUNDRY CO.—*K. S. Howard* has been appointed vice-president—steel foundry, and *E. W. Johnson*, vice-president in charge of sales of railway car equipment. Mr. Howard was

K. S. Howard

E. W. Johnson

formerly assistant vice-president, foundry division; Mr. Johnson, sales manager, car division.

■

GENERAL STEEL CASTINGS CORPORATION.—*Pierre O. Wood*, manager of service, has been appointed sales engineer at Granite City, Ill.

■

PULLMAN-STANDARD CAR MANUFACTURING COMPANY.—*N. E. Bateson* has been appointed deputy director of research at Hammond, Ind. Mr. Bateson, who joined the company in 1949, was in charge of the "TrainX" development. Since 1952, he had been associate director of the engineering design division.

■

ACF ELECTRONICS COMPANY. — A new division of ACF, at Alexandria, Va., specializes in engineering development and manufacturing in the field of electronics. It is headed by *J. Gilman Reid, Jr.*, recently resigned as director, electronics division, National Bureau of Standards.

■

ELECTRIC STORAGE BATTERY COMPANY.—*Edmund J. Fitzmaurice, Jr.*, supervisor of railway and motive power sales, has been appointed sales engineering and advertising manager of the industrial division.

■

PULLMAN COMPANY. — *George W. Bohannon*, general manager at Chicago, has been named operating vice-president. Mr. Bohannon, before becoming associated with Pullman in 1951, was chief mechanical officer of the Chicago & North Western.

■

MINNEAPOLIS-HONEYWELL REGULATOR COMPANY.—*William B. Barnard*, sales engineer, at Philadelphia, has been named assistant sales manager, transportation division, at Minneapolis.

■

KENNAMETAL, INC.—*Warren Eisenberg, Raymond Guenther*, and *Robert Welch* have been appointed sales representatives in the St. Louis, Southern, and New England districts, respectively.

Kennametal has under construction a new manufacturing plant and office building at Oak Park, Mich.

■

PYLE-NATIONAL COMPANY. — Pyle-National has opened a district sales office in downtown Chicago, at 80 East Jackson boulevard, under direction of *John H. Devol*, district manager. *F. Lee Davis* has been appointed manager of industrial sales, succeeding *Frank M. Currie*, named supervisor of field sales.

SECURITY LOCKNUT CORPORATION.—*D. V. Maher & Co.*, 900 Marshall building, Cleveland 13, and *W. A. Blackford*, 9330 Thermal street, Oakland, Cal., have been appointed railroad sales representatives in their respective territories for Security lock nuts.

■

BAKER-RAULANG COMPANY.—*William A. Bauer*, chairman of the board, has been elected also president, succeeding *James W. Moran*, retired.

■

AMERICAN BRAKE SHOE COMPANY.—*Kempton Dunn*, first vice-president, has been elected president. *Maurice N. Trainer*, president since 1950, has reached retirement age and has been appointed to the newly created post of vice-chairman.

Kempton Dunn

(*Continued on page 106*)

SUMMARY OF MONTHLY HOT BOX REPORTS

	Foreign and system freight car mileage (total)	Cars set off between division terminals account hot boxes			Miles per hot box car set off between division terminals
		System	Foreign	Total	
July, 1950	2,745,932,894	.....	.....	23,957	114,619
August, 1950	2,937,455,020	7,422	15,490	22,912	128,206
September, 1950	2,974,297,739	6,541	12,881	19,422	153,141
October, 1950	3,165,997,915	4,343	8,935	13,278	238,439
November, 1950	2,868,871,913	2,536	5,331	7,867	364,672
December, 1950	2,813,042,212	2,278	5,968	8,246	341,140
January, 1951	2,840,847,511	2,870	8,436	11,306	251,269
February, 1951	2,425,226,454	4,528	14,063	18,591	130,452
March, 1951	3,063,173,942	3,667	10,078	13,745	222,857
April, 1951	2,996,562,763	3,702	8,914	12,616	237,521
May, 1951	3,013,634,782	5,631	13,737	19,368	155,599
June, 1951	2,874,873,495	7,074	15,376	22,450	128,057
July, 1951	2,768,920,095	8,886	18,823	27,709	99,929
August, 1951	3,009,371,111	9,023	19,092	28,115	107,038
September, 1951	2,925,570,545	6,472	13,565	20,037	146,008
October, 1951	3,116,490,095	4,131	9,053	13,184	236,384
November, 1951	2,939,503,144	2,022	4,405	6,427	457,368
December, 1951	2,752,316,133	2,130	5,398	7,528	365,611
January, 1952	2,824,298,630	3,208	7,197	10,405	271,437
February, 1952	2,809,162,671	2,723	6,473	9,196	305,477
March, 1952	2,943,812,727	2,594	5,877	8,471	347,517
April, 1952	2,766,313,714	3,826	7,759	11,585	238,784
May, 1952	2,918,508,445	6,020	10,938	16,958	172,102
June, 1952	2,672,512,889	8,466	14,495	22,961	116,394
July, 1952	2,575,298,912	10,566	15,833	26,399	97,553
August, 1952	2,924,917,122	11,658	17,535	29,193	100,192
September, 1952	2,931,129,734	7,536	13,608	21,144	138,627
October, 1952	3,093,990,289	4,058	8,053	12,111	255,469
November, 1952	2,984,101,808	2,198	4,501	6,699	445,455
December, 1952	2,869,928,617	1,742	3,632	5,374	534,040
January, 1953	2,828,906,282	2,219	4,123	6,342	446,059
February, 1953	2,625,563,462	2,111	4,059	6,170	425,537
March, 1953	2,904,227,804	2,696	6,077	8,769	331,192
April, 1953	2,850,752,648	3,383	6,435	9,818	290,359
May, 1953	3,013,610,843	5,892	11,433	17,325	173,945
June, 1953	2,926,001,360	8,537	15,296	23,833	122,771
July, 1953	2,925,317,024	9,342	15,775	25,117	116,467
August, 1953	2,971,020,484	8,638	14,160	22,798	130,319
September, 1953	2,822,222,832	6,083	10,195	16,278	173,376
October, 1953	3,042,558,922	3,863	6,493	10,356	293,796
November, 1953	2,788,773,285	1,987	3,404	5,391	517,301

You know why a toupé costs so much. Because every hair must be matched and meticulously put in place by hand.

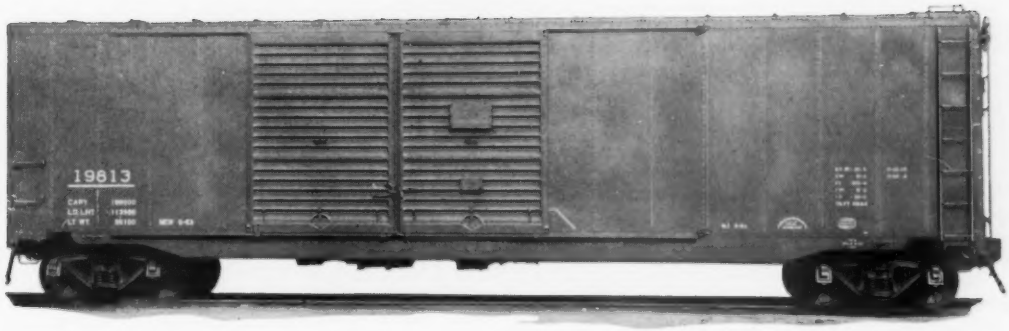
An automobile tire would cost much more than it does if it weren't for standardized sizes and the fabulous economies of mass production.

These same bargain economies are yours with ACF Standardized Design box cars, hopper cars, gondolas, or most any kind of freight car that ACF builds.

The moral of the story is: Plan your purchases well in advance. You save money on each order. Your revenues increase because you have the equipment to handle new business. Your service to present customers is improved and your daily maintenance costs hit a new low with modern equipment.

Fair enough? Then why not discuss your car purchasing program with an ACF Representative. He can give you many interesting facts and figures. American Car and Foundry Company, New York · Chicago · St. Louis · Cleveland Philadelphia · Washington · San Francisco.

moral about FREIGHT CARS!



a.c.f. CAR BUILDERS TO AMERICA'S RAILROADS

"57,000 Investors in Democracy"

HENRY FORD II

President, Ford Motor Company

"In the most practical way possible—the regular purchase of U.S. Savings Bonds—millions of Americans are demonstrating complete confidence in our form of government. Investors in democracy, they are freely staking their personal security on a fundamental faith in the future of our nation. I am proud that today more than 57,000 Ford Motor Company employees are participating in the Payroll Savings Plan. Last year they bought bonds worth $25,000,000 at face value, and this year the total of their purchases will be even greater. Through their thrift they are helping to keep America strong."

Few investment groups are as important to America as the members of the Ford Payroll Savings Plan. They are *important* in size—57,000 men and women... important in buying power—they actually purchase $25,000,000 in Savings Bonds every year... and *very* important to our economic stability—"through their thrift they are helping to keep America strong."

"Oh," someone may say, "Ford is a big company and they do things in a big way. It's easy for Ford to get thousands of people to sign up for the Payroll Savings Plan."

It was relatively easy for Ford, and it is easy for any company, large or small, to build a good Payroll Savings Plan *if*—(1) The head of the company recognizes the importance of the Payroll Savings Plan to the employees, the company, and the country; (2) *If* he will show the same degree of personal interest that Mr. Ford takes in the Ford Payroll Savings Plan.

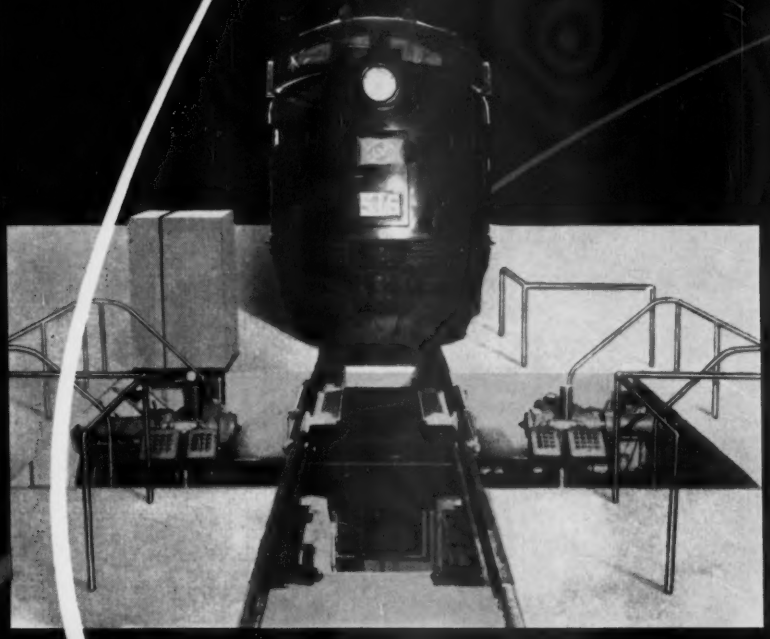
If you would like to match Mr. Ford's Payroll Savings record—percentage-wise, of course—all you have to do is to see to it that a Payroll Savings Application Blank is placed in the hands of every man and woman in your company. It will help, of course, if you remind them, over your signature, that the Payroll Savings Plan is a safe and sure road to personal security.

The Savings Bond Division, U.S. Treasury Department, Washington, D. C., is ready to provide all the help you need in the way of Application Blanks, literature, and a complete outline of a simple, person-to-person canvass that will put an application blank in the hands of *every* one of your employees. Your employees will do the rest.

The United States Government does not pay for this advertising. The Treasury Department thanks, for their patriotic donation, the Advertising Council and

RAILWAY LOCOMOTIVES AND CARS

Standard's



WHEEL TRUING MACHINE

BACK ON THE LINE
in one tenth the time!

Because Standard's destiny is that of the railroads,
every product of Standard's Railroad Laboratory
is designed to *create railroad profits!*

Standard

RAILWAY EQUIPMENT MANUFACTURING COMPANY

GENERAL OFFICE: 4527 Columbia Avenue, Hammond, Indiana
EXECUTIVE OFFICE: 310 S. Michigan Ave., Chicago 4
247 Park Avenue, New York 17 • First National Bank Bldg., St. Paul
582 Market Street, San Francisco 4.

(*Continued from page 100*)

BULLARD COMPANY.—*M. K. Peck* has been appointed assistant sales manager at Bridgeport, Conn.

The advertising department—Bridgeport 2—has, for loan on request, a silent motion picture on the Bullard vertical chuck-

M. K. Peck

ing grinder. The film, which is black and white, 16 mm., shows the precision, flexibility of control and safety design of the grinder. It has a running time of approximately 12 min.

■

INDUSTRIAL BROWNHOIST CORPORATION.—*W. W. Mossgrove* has been appointed assistant to sales manager at Bay City, Mich.

■

WYANDOTTE CHEMICALS CORPORATION.—*Richard C. Booth*, a paint chemist and process engineer, has been appointed to the Technical Service Staff of the company's Pacific coast plant at Los Angeles.

R. C. Booth

Wyandotte has begun construction of a plant at Los Nietos, Cal. The building, which is scheduled for completion in August, will contain research and technical service laboratories, manufacturing and shipping facilities, and the district sales office presently located at Los Angeles.

■

DEVILBISS COMPANY.—"Making the Most of the Spray Paint Method" is the title of a black and white, sound 16 mm. film produced by DeVilbiss for spray

painters and others interested in spray painting. The film, a 45-min. feature, illustrates the four basic principles of spray finishing—proper equipment, control factors, spray painting techniques, and the care, cleaning and maintenance of equipment. The film may be obtained for showings by writing to the company at 300 Phillips avenue, Toledo 1. A 32-page booklet covering the highlights of the film has also been prepared for distribution.

■

CONTINENTAL - DIAMOND FIBRE COMPANY.—*H. Rowell Conklin* has been

H. R. Conklin

appointed manager, Milwaukee office, succeeding *Walter R. Clarke*, deceased.

■

FAIRBANKS, MORSE & CO.—*H. E. Hanson*, diesel department manager, at St. Paul, has been promoted to manager of the branch in that city, succeeding *L. A. Weem*, transferred to the Beloit, Wis., works as manager of materials and schedules.

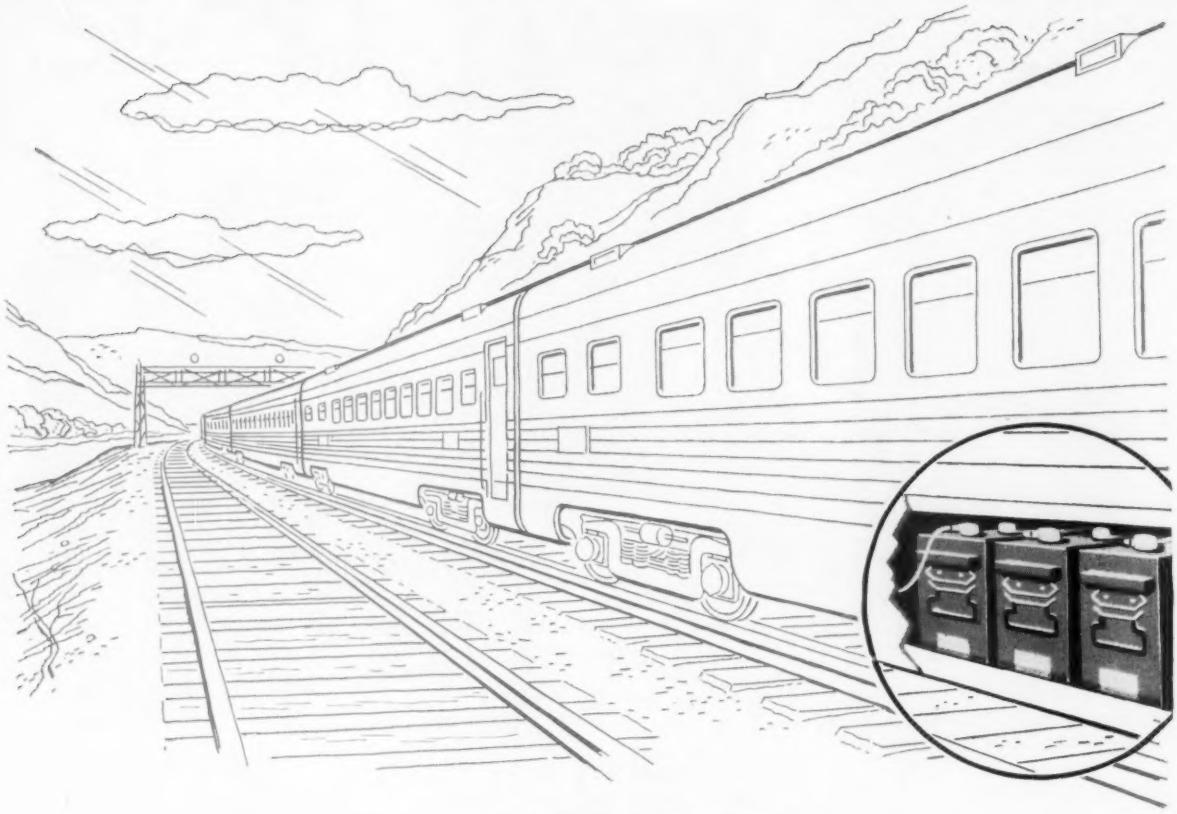
■

AMERICAN LOCOMOTIVE COMPANY.—Alco has established a new marketing organization, responsible for market research, product planning and all field sales. Management changes to staff the new organization include the appointment of

W. A. Callison

William A. Callison, formerly vice-president, eastern sales, as vice-president in charge of customer relations for all product divisions; *William F. Lewis*, formerly vice-

when light weight **is important...**



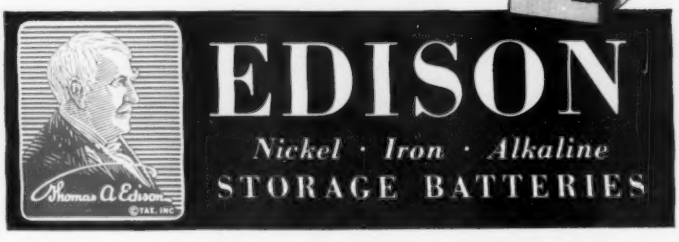
specify EDISON

AS MUCH AS 2000 POUNDS LESS WEIGHT per car for modern passenger car service is just one of the economies gained by railroads using EDISON batteries! And yet, this weight saving means high strength for rugged service as well—with EDISON steel cell container and plate design—construction that assures extremely long life.

DEPENDABLE POWER on the road is an outstanding characteristic of EDISON batteries for air-conditioning, car-lighting and other modern electrical services on today's passenger-train cars. High road capacity, quick capacity recovery following discharge intervals and freedom from both finish-rate and discharge limits are just a few of the operating advantages of EDISON batteries.

LONG LIFE FOR TRUE ECONOMY has been the experience of both large and small roads who equipped their passenger, head-end, or caboose cars with EDISON batteries. Many report an average service life of 18 to 25 years. For the up-to-date facts on today's finest railroad batteries, write for your copy of Bulletin SB 3802 and the name of your nearest Edison field engineer. Edison Storage Battery Division of Thomas A. Edison, Incorporated, West Orange, N. J.

Most Dependable Power—
Lowest Over-all Cost
...you get <u>both</u> with an EDISON



EDISON ALSO MAKES THE FAMOUS "V.P." VOICEWRITER AND THE TELEVOICE SYSTEM

president, western sales, as vice-president in charge of marketing; and *Arthur T. Lawrance*, formerly southwest regional sales manager, Alco Products division, as general manager of field sales, all products.

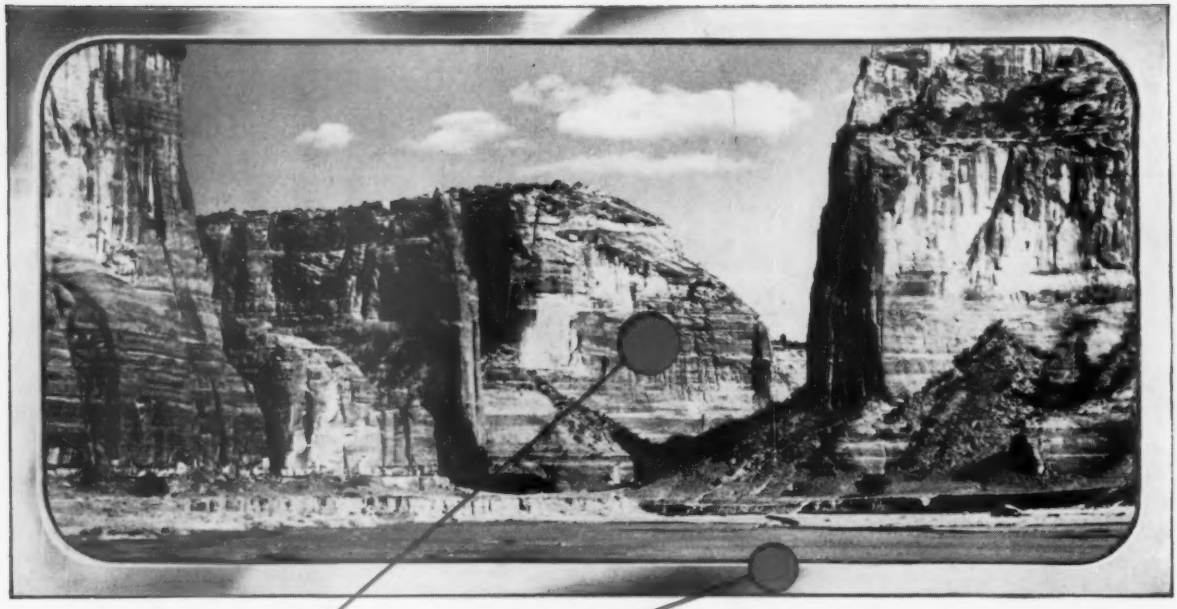
W. F. Lewis

A locomotive rebuild service has been established by Alco to rebuild and repair entire diesel units and their component parts. The service is designed to assist all railroads "to maintain and improve the high utilization standards inherent in the diesel locomotive," and "to keep locomotive repair costs at the lowest level possible without costly capital expenditure for major repair facilities." A portion of the diesel locomotive production facilities at Alco's Schenectady, N.Y., plant for the rebuild service. The service includes repair of wrecked or damaged diesels.

A. T. Lawrance

■

MORRISON RAILWAY SUPPLY CORPORATION; INTERNATIONAL RAILWAY CAR COMPANY.—In a relinement of operations of the Morrison Railway Supply Corporation and its affiliate, the International Railway Car Company, all car-building and repairs will be carried out by International, which will take over operation of the Buffalo, N. Y., car repair plant formerly conducted by Morrison. The car leasing program known as "The Morrison Plan" has also been turned over to International, as have leases involving approximately 500 freight cars. A part of International's Kenton, Ohio, plant will be used for freight-car repairs, but the main



MAINTENANCE, ZERO...

Visibility, Unlimited!

Adlake "BREATHER" WINDOWS

Yes, with absolutely no maintenance whatever except routine washing, ADLAKE "Breather" Windows stay crystal-clear regardless of temperature, humidity or altitude changes!

Windows are kept clear by the exclusive ADLAKE "Breather"—there are no dehydrants to change! And finally, panes which are broken in service can be replaced right on your own property . . . they do not have to be returned to the factory!

These are three good reasons why all major American railroads use ADLAKE "Breather" Windows. We'd like to give you more details on all of them, and a few additional reasons as well. Write The Adams & Westlake Company, 1152 N. Michigan, Elkhart, Indiana.

Adlake 97th year of serving the transportation and building industries

THE Adams & Westlake COMPANY

Established 1857 • ELKHART, INDIANA • New York • Chicago

Manufacturers of ADLAKE Specialties and Equipment for the Railway Industry

operation there will continue to be the building of cabooses.

Karl F. Long, formerly with the Pullman Company, has been appointed chief engineer for International, and *Alois C. Gesegnet*, formerly with the Merchants Despatch Transportation Company, has been named superintendent of the Buffalo operations.

■

DEARBORN CHEMICAL COMPANY.—*A. D. Nicolay* has been appointed man-

A. D. Nicolay

ager of sales and service of the Western Railroad Cleaner Department, with headquarters at Omaha, Neb.

■

EVANS PRODUCTS COMPANY.—*K. J. Tobin*, since 1947 midwest representative in Chicago for the Railroad Loading and Equipment division, has retired. Mr. Tobin was associated with development of the Evans DF car and will be retained on an exclusive consulting basis.

■

STANDARD FORGINGS CORPORATION.—*Robert D. Curley* has been appointed assistant vice-president, sales, at Chicago.

■

AMERICAN CAR & FOUNDRY CO.—*John H. Van Moss*, western sales manager at Chicago, who, at the company's re-

J. H. Van Moss

quest, has remained two years beyond normal retirement age, is now sales consult-

E. B. Carpenter

ant. *Ellsworth B. Carpenter*, district sales manager at St. Louis, has been appointed western sales manager there, with jurisdiction over Chicago, St. Louis and San Fran-

J. E. Angst

cisco sales offices. *John E. Angst*, assistant western sales manager, has been named district sales manager at Chicago.

■

BALDWIN-LIMA-HAMILTON CORPORATION.—*Kenneth A. Ayers* has been appointed district manager of its Washington, D.C., office. Mr. Ayers comes from Standard Oil Company of California.

■

MINNESOTA MINING & MANUFACTURING CO., IRVINGTON VARNISH & INSULATOR.—The name of the Fibron division of Irvington Varnish has been changed to the Plastics division.

■

MORTON MANUFACTURING COMPANY.—*Oren G. Rotemiller* has been appointed manager of sales and engineering; *Sherwood Basch*, acting chief engineer, and *Kenneth Oslund*, chief engineer, welding division.

■

PYRENE MANUFACTURING COMPANY.—*Arthur F. Ratzer*, executive assistant to president, has been named vice-president. *Maynard A. Laswell*, vice-president and founder of C-O-Two Fire Equipment Company, has also been made vice-president, sales, of Pyrene, with which C-O-Two became affiliated in 1933.

HEWITT-ROBINS INCORPORATED.—*L. C. Holloman, Jr.*, manager of the south central sales division at Houston, Tex., has been named assistant manager of the central sales division at Chicago.

■

GENERAL ELECTRIC COMPANY.—The new $1,000,000 apparatus service shop and warehouse in Philadelphia was formally opened on January 28. The structure is on an eight-acre site at Erie avenue and I street on the main line of the Pennsylvania.

■

GUSTIN-BACON MANUFACTURING COMPANY.—*K. H. Crone*, assistant Chicago division manager, has been named division manager of the company's New York sales offices.

■

PITTSBURGH SCREW & BOLT CORP.—*Robert McNeal Smith*, assistant vice-president, sales, eastern area, has been elected a vice-president.

■

BETHLEHEM STEEL COMPANY.—*J. V. Honeycutt*, assistant vice-president, has been elected vice-president, sales, succeeding *Paul Mackall*, retired.

PERSONAL MENTION

Belt Railway of Chicago

LAWRENCE J. BRASHER, master mechanic, has been appointed superintendent of motive power at Chicago.

Canadian National

W. H. BOULAY, superintendent of motive power, appointed superintendent of motive power can car equipment, Atlantic Regions (except the Newfoundland district), with headquarters at Moncton, N.B.

Career: Joined service of the CNR as a locomotive fireman at Campbelton, N.B., in 1916. Subsequently served as a locomotive engineer; night enginehouse foreman at Riviere du Loup, Que.; enginehouse foreman; master mechanic, Campbelton division; locomotive fuel supervisor, Atlantic Region. Appointed superintendent of motive power in 1952.

R. R. RISK, general foreman at Stratford, Ont., appointed acting superintendent of motive power and car, Northern Ontario district, with headquarters at North Bay, Ont.

VINCENT MCCARTHY, traveling engineer, appointed master mechanic, Newfoundland district, with headquarters at St. John's.

Canadian Pacific

G. C. TOMPKINS, production manager at Angus shops, Montreal, appointed assistant works manager (car) at Angus shops.

Chesapeake & Ohio

W. S. C. BURWELL, master mechanic (junior) at Russell, Ky., appointed master mechanic.

J. E. GARRETSON, master mechanic at Russell, Ky., has retired.

P. E. BRAMMER appointed special engineer—operations at Huntington, W.Va.

R. W. VAWTER appointed special engineer—operations at Huntington, W.Va.

Duluth, South Shore & Atlantic

A. G. GREENSETH, general mechanical superintendent, appointed assistant to vice-president at Minneapolis.

THOMAS F. KEARNEY, mechanical superintendent at Marquette, Mich., appointed general mechanical superintendent at Minneapolis.

Illinois Central

GEORGE J. LEHNERER, superintendent car department at Chicago, appointed assistant mechanical and research engineer.

LAWRENCE H. SCHIERBECKER, assistant superintendent car department at Chicago, appointed superintendent car department.

E. L. MARSALIS, general foreman car department at Waterloo, Iowa, appointed assistant superintendent car department at Chicago.

Great Northern

H. E. COLEMAN, general foreman at Superior, Wis., appointed shop superintendent.

New York Central

C. A. PEASE has been appointed industrial engineer—equipment, with headquarters at New York.

G. K. ROUSH has been appointed assistant industrial engineer—equipment with headquarters at New York.

Pennsylvania

J. G. LUCAS, assistant foreman car shop at Terra Haute, Ind., appointed supervisor methods and cost control, Southwestern division.

E. F. LINN, foreman car department at Crestline, Ohio, appointed supervisor methods and cost control, Fort Wayne division.

J. E. FULTON, assistant foreman, Buffalo car shop, Northern division, appointed foreman, Oil City car shop, Conemaugh division.

Pittsburgh & Lake Erie

HOWARD G. PIKE, superintendent of equipment, appointed to newly created position of director of research. Mr. Pike will be responsible for industrial engineer, transportation research, and evaluation of new management techniques.

JAMES J. WRIGHT, industrial engineer of equipment of the New York Central at New York, appointed to newly created position of manager of equipment of the P&LE, with responsibility over all matters pertaining to locomotive and car maintenance.

ANTON V. HILSTROM, general foreman, enginehouse, at McKees Rocks, Pa., appointed superintendent, diesel shop.

Career: Joined the P&LE in 1916 as a machinist helper. Subsequently served as a machinist; foreman, and, since 1947, as general foreman, enginehouse.

WILLIAM W. WALTER, general foreman, car shop, at McKees Rocks, Pa., appointed car shop superintendent.

Career: Became a freight car repairer on the P&LE at Haselton, Ohio, in 1918 and, after other promotions, foreman of car inspectors at Youngstown, Ohio; general foreman, Dickerson Run., Pa., car shop, and, in 1939, general foreman, car shop, at McKees Rocks.

REYNOLDS A. SUBER, roundhouse foreman at Youngstown, Ohio, appointed general foreman, diesel shop, at McKees Rocks, Pa.

NEW DEVICES

(Continued from page 84)

Open End Wrenches

A line of heavy duty open end wrenches that are used with detachable tubular handles and designed for heavy nut turning has been perfected by Snap-on Tools Corporation, Kenosha, Wis. The series consists of ten wrenches with a size range of ⅞ to 1½ in. with three different length handles.

The device has a spring mounted locking button which fits a hole in the tubular handle to lock them together. They cannot be separated accidentally.

Heads of the wrenches are set at a 15-deg. angle to the handle for easy nut turning when space is restricted. Handles can be used with straight and offset-type boxsockets.

■

Contact Welding Electrode

A new contact electrode which may be held in contact with the surface to be welded has been announced by the General Electric Company's Welding Department, Schenectady, N. Y.

Best suited for work on mild and medium carbon steel, the rod is designed for welding machinery, low pressure storage tanks, and light structural work.

Tests have shown that the electrode consistently produces a higher rate of weld footage than conventional electrodes. The quantity of deposited metal, the maker claims exceeds some manual automatic processes.

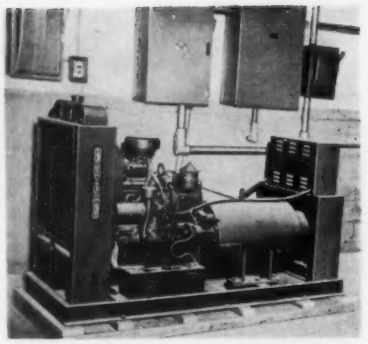
Encased in a rutile-type covering enriched with iron powder, the rod can be used on horizontal and flat position fillets and laps, single and multiple pass butts, and deep grooves and cover passes on multiple-pass butt welds.

Since the electrode is of the contact type, less physical effort is expended in welding. For the same reason, less welding skill is required of the worker.

Automatic Standby Power Plant

The Ready Power Company, 11231 Freud Avenue, Detroit 14, Mich., has introduced three-engine-generators, powered by Chrysler industrial engines, which are rated respectively 50, 30 and 20 kw.

Engine features include sodium-cooled exhaust valves, air-cooled generator, a by-pass thermostat cooling system, down-draft carburetion, micro-babbitt bearings, and superfinished bearing surfaces. A heavy base of welded structural steel is incorpo-

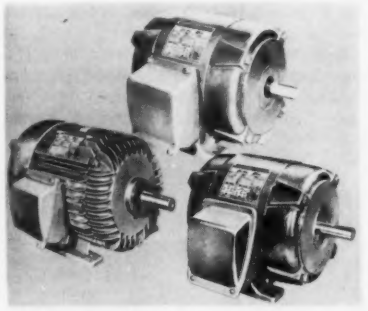


rated in the design to assure easy installation and permanent alignment without need of a special foundation.

Each unit is a complete, packaged electric power generating plant ready for operation. Engine and generator controls are located in a single, simplified control cabinet.

The units are designed for either standby or continuous service, and may be equipped for fully automatic emergency standby service.

■



Smaller and Better Motors

A new line of induction motors called the Life Line-A is being announced by the Westinghouse Electric Corporation, Pittsburgh, Pa. The motors are designed to offer users longer motor life, greater flexibility in application, and higher reliability as well as decreased size. The motors have improved ventilation, better insulation, a more efficient and better protected bearing and are quieter and smaller per horsepower, conforming to the new N. E. M. A. standard dimensions. They are available in three enclosures; totally-enclosed—fan cooled; totally-enclosed—non-ventilated; and drip-proof, as shown from left to right in the illustration.

Wire, coil, dip, and cable insulations are all new. The Bondar wire insulation is a synthetic resin of high thermal endurance, which is claimed to have a life of over three times that of other wire insulations now in use—this increased life being obtained without sacrifice of dielectric strength. Motor coil insulation is a combination of Mylar polyester film and rag paper that has a dielectric strength of

(*Turn to page 118*)

Rugged and raring to go...

THANKS TO BATTERY POWER!

Today's air conditioning and lighting loads require batteries that have kept pace with the times—extra-reserve batteries that are ready and raring to go under the most severe service conditions. Gould Kathanode Batteries with new Diamond "Z" Plates give you this added reserve. Choose them and you increase car availability, cut maintenance costs, reduce yard charging and get maximum battery power dependability.

Specify
GOULD KATHANODE
BATTERIES
with New Diamond "Z" Grids
for Air Conditioning
and Car Lighting

GOULD RAILROAD BATTERIES

GOULD-NATIONAL BATTERIES, INC., TRENTON 7, N. J.

Always Use Gould-National Automobile and Truck Batteries

NEW DEVICES

(*Continued from page 116*)

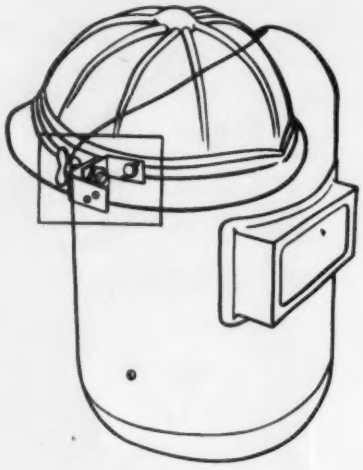
four times that of varnished cloth and a heat endurance of three to four times. The Bondite dip insulation, which insulates the entire wound stator, is a phenolic-alkyd thermosetting-type varnish with silicone. It has, at elevated temperatures, a life of 170 per cent of the previously used dip insulation. By incorporating the silicone into the varnish a permanent, water-repelling coating is obtained. The cable insulation, a lacquered glass braid covering, has an operating temperature of 75 deg. C., compared to 60 deg. C. for previously used cable insulation.

The ventilation system on the drip-proof motor has been improved so that this motor is now suitable for both indoor and outdoor use and for all applications where a totally-enclosed motor is not required. The ventilation system is a straight through design with the ventilation openings located in one quadrant of the rim of the end bracket. This location protects the motor from overhead drippings regardless of mounting position.

The motors have what is called a four-way bearing seal. There are two seals on each side of the bearing. The inner seal is stationary and is attached to the outer bearing race. Its function is purely that of a seal. The outer seal rotates and is attached to the inner bearing race. This rotating seal acts as both seal and flinger to throw-off any foreign particles attempting to enter the bearing.

The frames of all the Life Line-A motors are of cast iron. All finishes on the motors are corrosion resistant. Sizes range from 1 to 30 hp.

■



Lock Fastener Safety Device

This device, developed to improve the safety and functional convenience of safety helmets and welding masks, permits fast attachment and separation of the helmet and mask without removing helmet from the head.

Announced by the Davis Emergency Equipment Company, 45 Halleck st., Newark, N. J., the unit consists of a simple spring lock fastener. A metal post on each side of the mask plugs into a lug fastened to each side of the helmet. A twist secures it in place and a reverse twist causes it to disengage.

The device may be used with helmets and masks other than those manufactured by Davis.

■

Power-Off Clock Correction

Compensation for prolonged power interruptions due to electrical storms, shutdowns for maintenance and repairs, and other unavoidable occurrences is provided with a 12-hr. self-regulating electronic time system made by International Business Machines Corporation, 590 Madison Avenue, New York 22.

This new system's extended range of correction is provided twice each day for all indicating clocks that have fallen behind more than one hour, making it possible to correct automatically clocks with time lags of as much as 11 hours, 59 minutes, and 5 seconds. Time lags of 59 minutes or less, or fast errors of up to 55

seconds, are still supervised hourly and corrected in one minute as in other I.B.M. time systems. All units showing correct time remain unaffected by hourly or 12-hourly supervisory signals. Any desired hour may be selected for the 12-hr. correction cycle.

This system does not require any special clock and signal wiring, and it can be easily expanded and relocated. Existing installations of I.B.M. self-regulating electronic or synchronous-wired systems can be expanded to full 12-hr. correction.

■

Silicone Rubber

Two new silicone rubber products, one a molding compound (Silastic 675) and the other a paste (Silastic 132) have been announced by the Dow Corning Corporation, Midland, Mich.

Silastic 675 is an easy-to-handle, fully compounded molding material. It possesses properties particularly suited to fabricating such items as gaskets, seals, diaphragms, O-rings, bellows, switchboots, and dielectric fittings and connectors. Parts fabricated from Silastic 675 remain flexible at temperatures lower than minus 100 deg. F. and retain excellent properties in service at temperatures as high as 500 deg. F.

The material exhibits the lowest compression set of any extreme temperature silicone rubber stock available. It compares favorably with the best low compression set stocks which are only serviceable over a narrower temperature range. Compression set of Silastic 675, for example, is in the range of 15-20 per cent after 22 hours at 300 deg. F.; 20 to 28 per cent after 70 hours. It does not contain any toxic additives.

Silastic 675 also offers the advantage that it has low shrinkage characteristics—about 2.8 per cent; 1.8 per cent in molding and about 1.0 per cent during the full oven cure of 24 hours at 480 deg. F. In many applications, it can be fabricated in molds designed for conventional organic rubber parts.

(*Continued on page 122*)

Look...the New 40A RIDGID Tristand

with built-in folding tray

Tray pushes up easily to fold Tristand, pushes down easily to set up. Holds stand rigid.

Vise base overhangs front legs so threader handles swing clear. Perfect tripod and balance.

The Tristand you've been wanting. Now stand and tray all one unit—no loose parts. Extra-light weight, stronger more rigid than ever. Full size vise base—3 benders, ceiling brace screw, pipe rest, new tool-hanging slots. Designed for the utmost service for your money. See the new RIDGID 40 A Tristand at your Supply House! Immediate deliveries!

Folds up small as ever for easy carrying to job and it's extra light-weight.

THE RIDGE TOOL COMPANY · ELYRIA, OHIO, U.S.A.

RIDGID
Work-Saver Pipe Tools

America's Railroads Agree:

DY-NAMIC BALANCING IS NECESSARY TODAY!

AIR CONDITIONING operates with less vibration!
WHEELS run smoother!
ARMATURES last longer!
BEARINGS wear slower!

At B & O Mt. Clare Shops, Baltimore, Md. every traction motor and generator armature is Dy Namically Balanced before reassembly, to reduce vibration and extend motor life.

A partial list of railroads using "Bear" Machines to balance traction & generator armatures, diesel crankshafts and armatures, air conditioning equipment, etc.

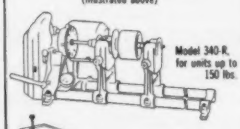
- The Pullman Company
- Chicago, Rock Island, & Pacific R. R. Co.
- Illinois Central System
- Chicago & Eastern Illinois R. R.
- Missouri-Kansas-Texas R. R. Co.
- Chicago, Burlington & Quincy R. R.
- Norfolk & Western R. R.
- Reading Company
- Baltimore & Ohio R. R.
- Chicago, Milwaukee, St. Paul & Pacific
- New York Central Railroad
- Fort Worth & Denver R. R.

Special "Bear" Models for Railroad Balancing Requirements make it Easier, More Economical to get the Benefits of Dy-Namic Balancing

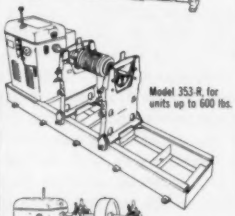
Today, there is sufficient performance data accumulated by railroads to make it evident that Dy-Namic Balancing is an important factor in cutting railroad maintenance costs. Dozens of leading railroads, such as those listed above have found that the adoption of Dy-Namic Balancing as a standard maintenance operation has been more than warranted by savings in lower costs, repairs, labor and reduced lay-up time. "Bear" Models, specifically designed for railroad work bring you ALL THE BENEFITS of DY-NAMIC BALANCING because:

- **they make it possible to balance armatures with minimum time and effort.**
- **they enable operator to change from one shaft size to another in minutes.**
- **they are highly accurate and dependable in all measurements.**
- **they prevent the "weaving action" often caused by static balancing alone because they do both static and dy-namic balancing simultaneously.**
- **they are easy to operate . . . do not require skilled technicians.**

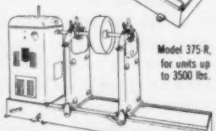
Model 400-R, for units up to 8 tons (illustrated above)



Model 340-R, for units up to 150 lbs.



Model 353-R, for units up to 600 lbs.



Model 375-R, for units up to 3500 lbs.

FREE BULLETINS

Get full details by sending for your FREE copies of these "Bear" Bulletins on RAILROAD DY NAMIC BALANCING.

Write Bear Mfg. Co., Dept. R-2, Rock Island, Ill.

565 **"BEAR"®**

STATIC AND *DY-NAMIC BALANCING* MACHINES

NEW DEVICES

(*Continued from page 119*)

Parts fabricated from Silastic 675 for electrical applications retain good dielectric properties over a wide range of temperatures, are moisture repellent, and are highly resistant to the effects of high humidity or immersion in water.

Silastic 132 is a silicone rubber paste for coating glass cloth or organic fabrics, to be used in either mechanical or electrical applications.

It provides a coating that has good resistance to abrasion and to a variety of chemicals and oils. It is serviceable at temperatures from minus 70 deg. F. to 500 deg. F., exhibits low water absorption, and retains good dielectric properties even after aging at 280 deg. F. and flexing.

Coatings exhibit good film hardness. For example, when coated onto heat treated ECC 116 glass cloth and tested with the Hoffman Scratch Hardness Tester, Silastic 132 coatings showed a scrape hardness of 300. The same cloth, commercially coated to a seven mil overall thickness, gave a tensile strength of 156 lb. per in., when tested lengthwise; 132 lb. per in., crosswise.

Other samples of the same type glass cloth, laboratory coated to an overall thickness of 10 mils, were creased 4 times and tested for retention of tensile strength. Tested lengthwise, the creased samples retained over 60 per cent of original tensile strength; crosswise over 70 per cent.

Similarly coated samples which gave an original dielectric strength of 1,100 volts per mil. showed no decrease in dielectric strength after 9 days at 480 deg. F.

D.C. 400-Amp. Rectifier-Type Welder

A 400-amp., three-phase, d.c. rectifier-type welder with a 60 per cent duty cycle has been announced by the General Electric Company's Welding Department, Schenectady 5, N. Y.

Designated as Type WR40A, the new welder can be equipped to operate on two-phase power and has a current welding range of 70 to 500 amp. It can be utilized with a variety of electrode sizes for repair, maintenance, and construction work.

According to the manufacturer, the selenium rectifier welder makes it easy for operators to achieve current adjustments by means of a stepless current control. Quiet operation is a feature of the welder, and maintenance is simplified since the unit's pieces are easily removed.

Instant arc starting is assured since there is no inductive time lag as usually found in motor-generator sets. Class H (silicone) insulation gives extra protection against high temperatures and is moisture, fume, and chemical resistant.

To further protect the coils and cool the rectifier stacks, a reversible 14-in. forced-draft fan, rated for continuous service, provides ventilation and prevents hot spots. The life of rectifier stacks can be prolonged by means of the self-cleaning action obtained through reversing fan operation periodically.

(*Continued on page 126*)

ANNOUNCING...

A NEW TIME-SAVING, MONEY-SAVING PLAN... FOR EQUIPMENT OWNERS...

THE BRODERICK & BASCOM Yellow Strand SPEEDI-SERVICE PLAN

Now you can insure immediate delivery of the *right* wire rope at the right time! You can increase equipment earning time, decrease down time!

Now you can save time and money with the Yellow Strand Speedi-Service Plan!

There's no extra cost, no obligation. All you do is have your nearby Broderick & Bascom distributor register your equipment. Then, when you need rope, just call, giving machine make and model and the particular rope needed. The exact size, length and type will be obtained from your record file and the order filled from stocks controlled by these records. Delivery is made according to your recorded instructions.

Start saving time and money with the Yellow Strand Speedi-Service Plan. Call your Broderick & Bascom distributor or mail the coupon.

HOW THE SPEEDI-SERVICE PLAN SERVES YOU...

1. File cards, describing each of your machines and its wire rope requirements are filled in by your Broderick & Bascom distributor.

2. The cards are placed in an active file, where your distributor can go to tell in an instant what type and size of rope you will need for any machine.

3. When a line requires replacement, call your Broderick & Bascom distributor. Tell him which machine needs the rope. He will refer to his records and fill your order immediately from his ample stock of long-lived Yellow Strand.

TO START YOUR SPEEDI-SERVICE PLAN... MAIL COUPON

Broderick & Bascom Rope Co.
4203 Union Blvd. • St. Louis 15, Mo.

Gentlemen:

I'm interested in saving time and money with the Speedi-Service Plan.

- ☐ Send me the folder describing the Speedi-Service Plan.
- ☐ Send me the Speedi-Service Plan Equipment Registration Form.
- ☐ Send me the name of my Broderick & Bascom distributor.

Signed.....

Company.....

Address.....

City..... State.....

SPECIFY...

Yellow Strand®

FOR SAVINGS... SAFETY... SPEEDI-SERVICE

...a product of Broderick & Bascom Rope Co. St. Louis, Mo.

Manufacturers' Literature

Following is a compilation of free literature, pamphlets and data sheets offered by manufacturers to the railroad industry. Circle the number (s) on the coupon below to receive the information desired; the requests will be sent direct by the manufacturers.

1. ELECTRICAL TAPES. *Minnesota Mining & Mfg. Co.* 12-page, 2-color booklet completely illustrates and describes how "Scotch" brand electrical tapes speed up electric motor construction and repair.

2. FREIGHT CAR FLOORING. *Armco Steel Corp.* 20-page illustrated booklet "Armco Freight Car Flooring" describes composite steel and wood flooring for gondola, box and flat cars, designed for both new construction and replacement of worn-out wood or steel-plate floors.

3. SPRINGS. *Henry Miller Spring & Mfg. Co.* 36-page catalog "Railroad and Industrial Springs," includes a step-by-step spring manufacture presentation, product pictures of springs for railroads, mine cars and other industrial applications, the Miller straight-line production layout, and certain machining operations.

4. BLAST CLEANING. *Pangborn Corporation.* 36-page booklet "Blast Cleaning" explains abrasive cleaning in a non-technical way giving data to anyone desiring to know more about blast cleaning possibilities in his field.

5. CEMENTED CARBIDE PRODUCTS. *Kennametal, Inc.* 76-page general catalog (#54) gives complete specifications and net prices of the Kennametal line of cemented carbide tools.

6. SPUR GEAR HOIST. *Coffing Hoist Company.* Bulletin (CH) describes, illustrates, and gives specifications for the light-weight spur gear hoist "Challenger," and includes a cutaway drawing showing design and ease of servicing.

7. PORTABLE ELECTRIC TOOLS. *Albertson & Company, Inc.* 44-page 4-color catalog (#54) presents the complete line of Sioux Portable Electric Tools for distributors and dealers in Railway and other industrial fields.

8. EMULSION CLEANERS. *Turco Products, Inc.* Bulletin (A-106) gives information on the complete line of seven Turco emulsion cleaners, including an "Emulsion Cleaner Reference Chart."

9. 70-TON LOCOMOTIVE. *General Electric Co.* 16-page Bulletin (GEA-4657B) describes, illustrates, gives specifications, and lists owners of the Middleweight Champion, the G-E 70-ton, 600 horsepower locomotive.

10. FOREIGN G-E LOCOMOTIVE USERS. *General Electric Co.* 12-page folder (GEA-6009) lists all users of G-E diesel-electric industrial locomotives other than those in the U. S. and Canada; subdivided by locomotive size, user and country.

11. FREIGHT CARS. *Chicago Freight Car & Parts Co.* 24-page brochure illustrates and describes their complete freight car service to railroads and industry, with action shop pictures.

12. BATTERIES. *Gould-National Batteries, Inc.* 64-page "pocket-size" booklet gives "Instructions & Technical Data for Gould Rubber Jar Batteries," containing a brief treatise on the theory of the lead-acid battery and detailed instructions on the care and operation of batteries.

13. MATERIALS HANDLING. *Hyster Company.* File folder (Form #1270) "Operation Hyster for Railroads" contains materials handling ideas and case studies with on-the-scene photos and the names and addresses of materials handling equipment dealers.

14. AIR HYDRAULIC JACK. *The Duff-Norton Mfg. Co.* Brochure gives complete details and specifications of a new 30-ton capacity hydraulic jack powered by a detached air motor.

15. AIR HORNS & WHISTLES. *Leslie Company.* Bulletin (R-512) illustrates and describes the features of the Supertyfon chime horns; and (TD-531) gives detailed drawings and specifications of Supertyfon air horns and whistles.

16. SILICONE RUBBER PRODUCTS. *Garlock Packing Company.* 8-page bulletin "Garlock Silicone Products" describes and illustrates some of the Garlock line, including: diaphragms, gasketing, sheet packing, oil seals, rings, insulation tape, rod and valve stem packings.

17. FLEXIBLE TUBING. *Pennsylvania Flexible Metallic Tubing Co.* Illustrated data book "Penflex Flexineering" explains this scientific application of flexible tubing for air, oil, steam, gases and volatiles, and gives data on Penflex products and applications.

18. RUST PREVENTION. *Rust-Oleum Corporation.* 20-page general catalog (#253) gives a specialized story on rust prevention to show industry how to stop rust, features 94 color chips of Rust-Oleum products.

Reader Service Department — MARCH, 1954
Railway Locomotives and Cars
30 Church Street, New York 7, N. Y.

Please send literature circled below:

1	2	3	4	5	6	7	8	9
10	11	12	13	14	15	16	17	18

Name ..... Title or Position .....

Company .....

Address .....

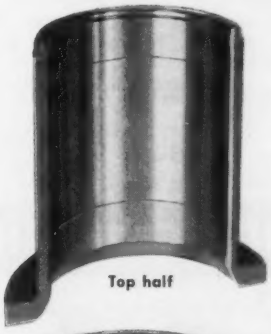
City ..... Zone ..... State .....

Centrifugal Lining by Bearing Experts

... that's one reason why you get

MAXIMUM *TROUBLE-FREE* MILEAGE

with **MAGNUS TRACTION MOTOR SUPPORT BEARINGS**



THESE High Mileage bearings are precision lined with heat-resistant Satco metal, centrifugally applied. This assures uniform hardening and density and a permanent bond—a lining that stands up longer under high temperatures, gives maximum resistance to wear and load.

There are other important advantages, too. Interchangeable double keeway permits any bearing to be used on either the commutator or pinion end of the shaft. Perfectly mated bearing halves are micrometer tested under load, assuring paralleled ID and OD. And the hi-strength brass backs are finish bored on special precision machines.

These features combine to give you a bearing you can depend on for maximum trouble-free performance between motor overhauls. For complete information, send for your copy of Bulletin No. 6000. Magnus Metal Corporation, 111 Broadway, New York 6, N. Y.; or 80 East Jackson Blvd., Chicago 4, Ill.

IT PAYS TO PLAY SAFE!

Use only NEW Magnus Bearings for replacement purposes

New High-Mileage Magnus bearings cost so little because of skilled production methods they can usually be furnished for less than the cost of rebuilding worn bearings. And only new Magnus bearings give full protection to your big investment in Diesel locomotives.

MAGNUS

High Mileage

TRACTION MOTOR SUPPORT BEARINGS

... for every type and make of diesel locomotive

MAGNUS METAL CORPORATION *Subsidiary of* **NATIONAL LEAD COMPANY**

NEW DEVICES

(*Continued from page 122*)

The welder is operable on 220/440 volts reconnectable to either voltage. It is also available with full-time arc force control which minimizes popouts and freezing-in.

The unit is 35-in. wide, 26-in. deep, 47-in. high overall, and weighs 660 lb.

■

Lead-Plated Switch Enclosures

Lead-plated, sheet-steel enclosures for safety switches and circuit breakers are being produced by the Trumbull Components Department, of General Electric Company, Plainville, Conn. The new enclosures are designed for outdoor use and other special applications where cast-iron enclosures were previously used. They are designed for use where humid, dust-laden and corrosive atmospheres prevail. According to test data, the inert lead coating, unlike cast-iron surfaces, effectively resists the corrosive effect of acid, alkali and salt spray.

Lead-plated enclosures are also much lighter than cast-iron types and accordingly easier to handle and install.

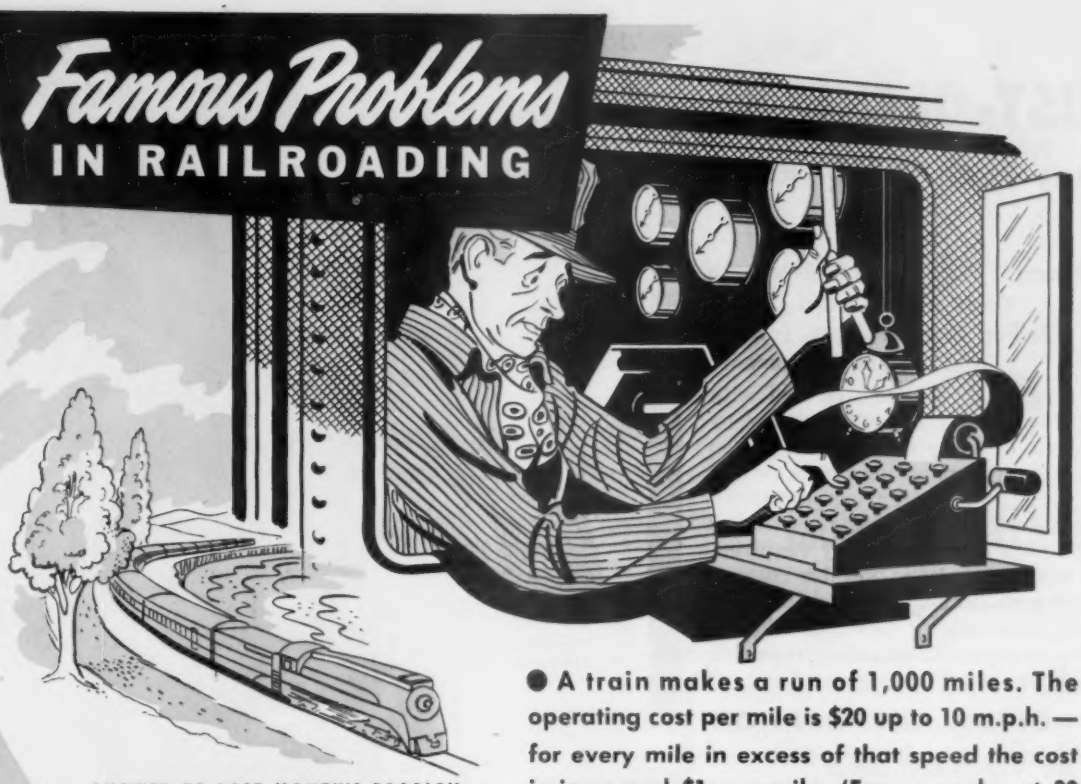
■

Constant Voltage Insulation Tester

Essentially constant d.c. test voltage, independent of ohmic value being measured, is a characteristic of a portable, dry-cell-operated resistance measuring instrument, called Vibrotest, Model 266 made by Associated Research 375 W. Belmont Avenue, Chicago 18. It is made with a new circuit which uses no vacuum tubes and is designed around a synchronous vibrator power supply having a maximum output current of 400 microamperes at 500 volts d.c. potential. Megohm ranges are 1-100 and 10-1000.

(*Continued on page 130*)

Famous Problems IN RAILROADING



ANSWER TO LAST MONTH'S PROBLEM

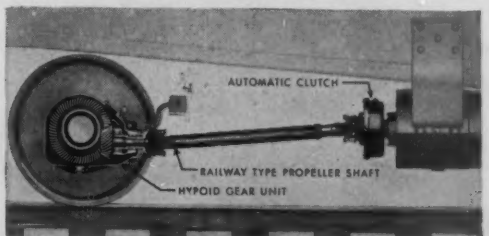
282,240 ways. Of course, we assume that he would put the caboose only at the end of the train! That leaves only 9 cars to play with — and since the tank car has to be at least two cars from the engine, that means he has 8 cars that could be right behind the engine and 7 in second position. Now the tank car can be used — so he has 7 cars he can put in third position, 6 in fourth and so on. So for the entire train we arrive at 8 x 7 x 7 x 6 x 5 x 4 x 3 x 2 x 1 = 282,240.

● **A train makes a run of 1,000 miles. The operating cost per mile is $20 up to 10 m.p.h. — for every mile in excess of that speed the cost is increased $1 per mile. (For example, at 30 m.p.h. the cost per mile is $40). There is a penalty, however, of $500 for every hour over 20 consumed in making the 1,000 mile run. Assuming that the road wants to show a profit, what is the most economical speed for the train?**

See next month's Spicer Generator Drive advertisement for correct answer.

Famous Solutions TO RAILROADING PROBLEMS

The problem of delivering power for electrical energy from the axle to the generator is quickly and easily solved by the modern Spicer Generator Drive. Its design has been proved during the past 50 years in many millions of automotive driving power transmission installations.



Spicer Positive Railway Generator Drives can be quickly and economically adapted to new car designs and reconditioning jobs.

And in the railroad world, over 10,000 Spicer Generator Drive installations have been made in nearly a hundred railroads throughout the world!

The Spicer Railway Generator Drive consists of a very simple application of long-lived hypoid gear and pinion mounted on a standard axle. The drive from the gears is positive and constant through Spicer Universal Joints and Propeller Shaft to the Spicer Automatic Clutch mounted between the generator and propeller shaft.

Our experience in adapting the Spicer Generator Drive to the varied needs of a large group of railroads will help solve your electrical-generating problems. Write for literature today.

The Spicer Railway Generator Drive is manufactured, sold and serviced by

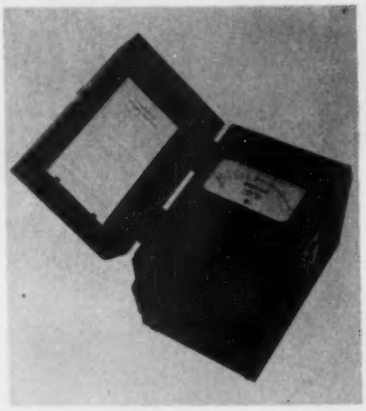
SPICER MANUFACTURING DIVISION
OF DANA CORPORATION
TOLEDO 1, OHIO

50 YEARS OF Spicer SERVICE

ENGINEERING DANA MANUFACTURING

NEW DEVICES

(Continued from page 126)



The instrument is designed to be a self-contained instrument for application where resistance values may fluctuate widely unless the test voltage is well regulated. Is is housed in a rugged steel case with a removable cover, and measures 8 ⅞ in. x 6 in. x 8¼ in. The weight is 18 lb.

■

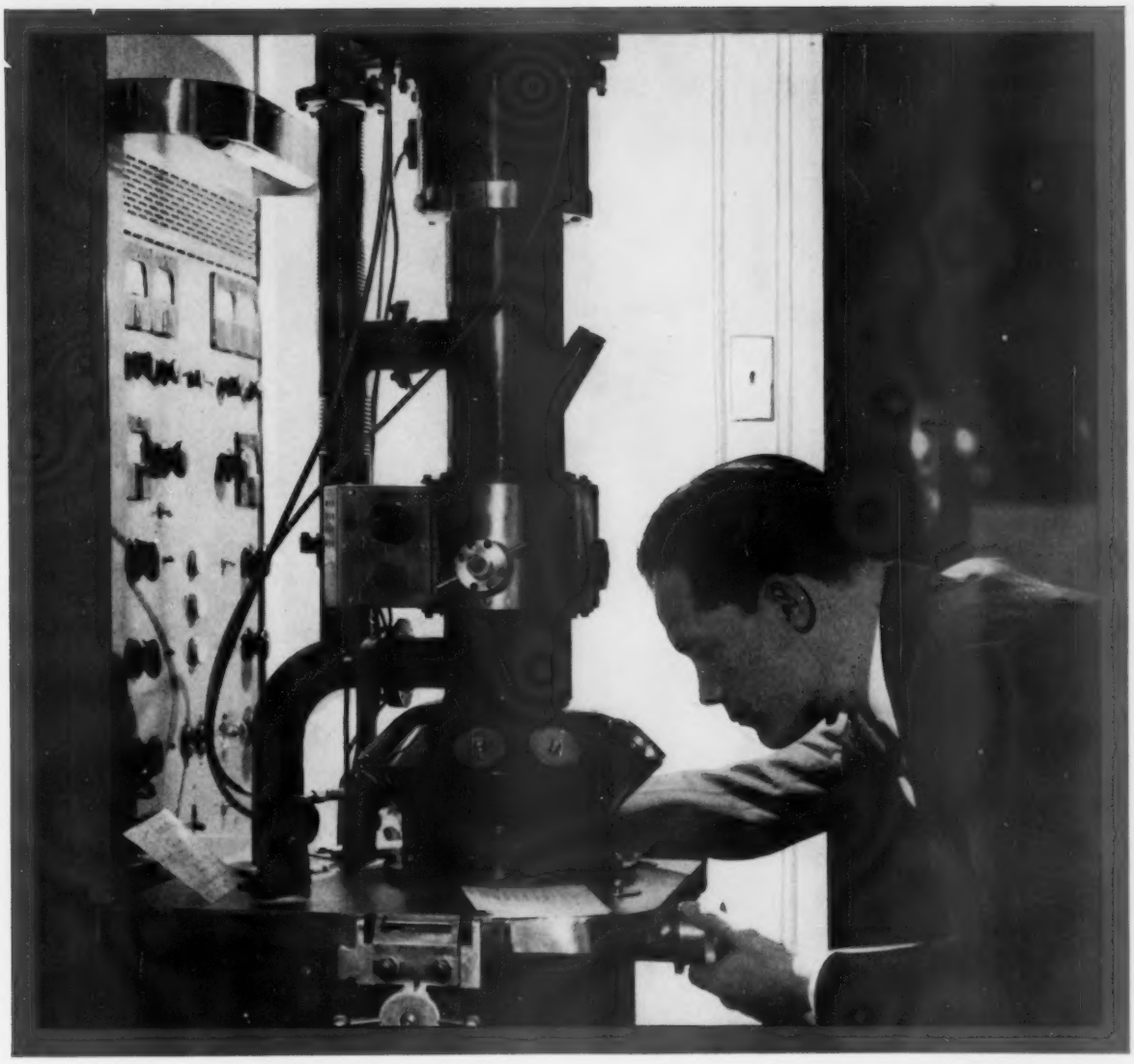
Hydraulic Journal Jack

This jack was designed principally for servicing journal boxes on the heavier type freight cars. Of 35-ton capacity, it is available from Duff-Norton Manufacturing Co., Pittsburgh 30, Pa.

The unit has an automatic air vent which eliminates 90 per cent of air-lock difficulty. It weighs 55 lb. and is said to be 25 per cent lighter than other types of same capacity because vent design permits use of smaller reservoir.

It has a closed height of 9.7 in., total height of 15¾ in., its base is 6 by 8 in. and it is equipped with a 28-in. handle.

—ADVERTISERS IN THIS ISSUE—



He's working on your problem right now...

The Esso Research Engineer, above, is examining a specimen through the electron miscroscope, the amazing electronic research instrument that magnifies the specimen many thousand times.

Qualified teams of field and lab researchers, using such equipment, are constantly developing new and better products to meet rugged fuel, lubrication and operating requirements.

Making a better product for better railroading is our business... and it's going on all the time.

Like *All* Esso Railroad Products These Assure You Dependable Performance

- Diesel Fuels
- Esso ANDOK Lubricants—versatile greases
- ARACAR—journal box oils
- ARAPEN—brake cylinder lubricant
- Esso XP Compound—hypoid gear lubricant
- DIOL RD—Diesel lube oil
- COBLAX—traction motor gear lube
- VARSOL—Stoddard Solvent
- Solvesso—Aromatic solvent
- Esso Weed Killer
- Esso Hot Box Compound
- AROX—pneumatic tool lube
- CYLESSO—valve oil
- Esso Journal box compound
- Asphalt
- Cutting Oils
- Rail Joint Compounds
- Maintenance of Way Products
- Signal Department Products

Esso

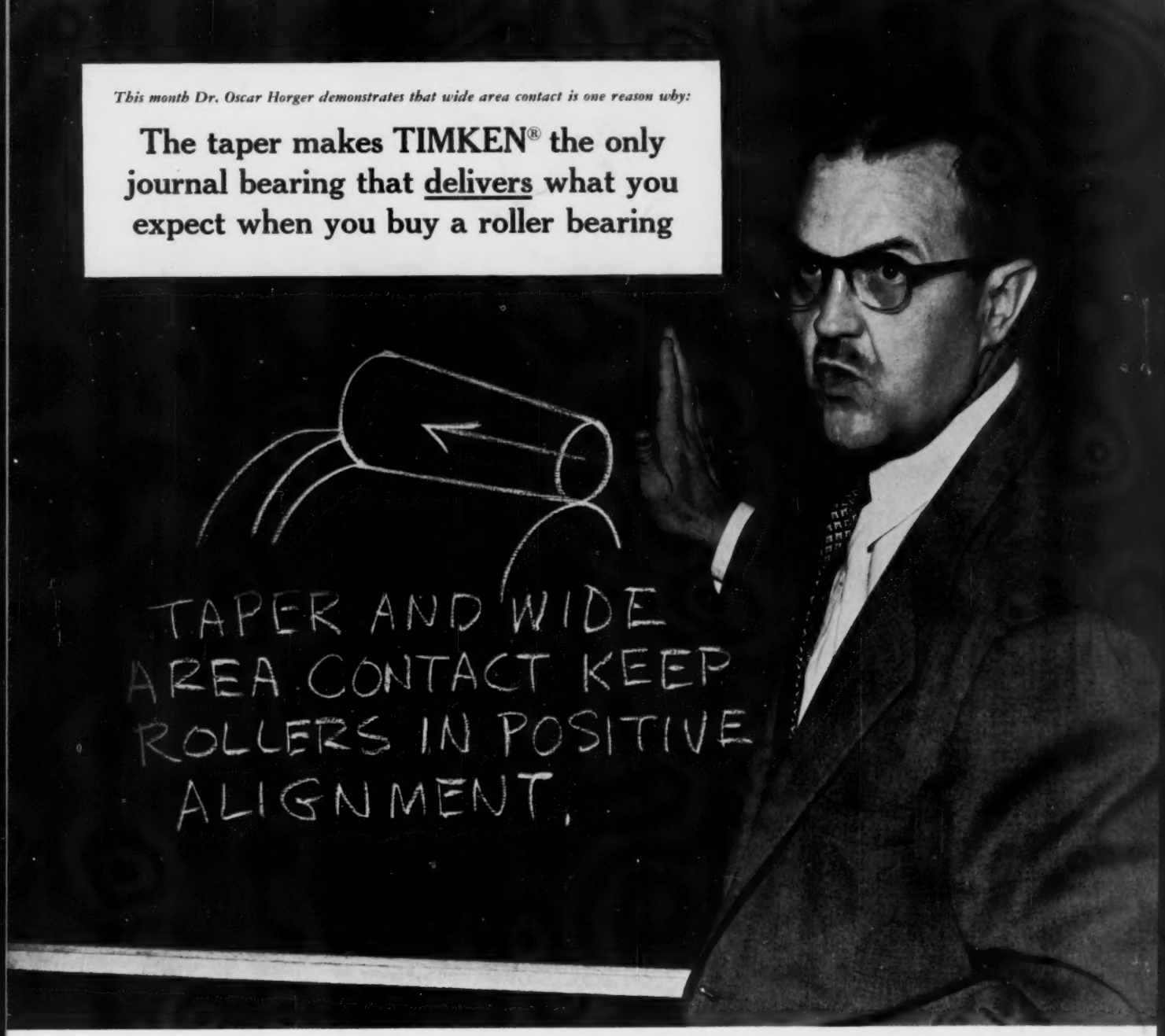
RAILROAD PRODUCTS

SOLD IN: Maine, N. H., Vt., Mass., R. I., Conn., N. Y., N. J., Pa., Del., Md., D. C., Va., W. Va., N. C., S. C., Tenn., Ark., La.

ESSO STANDARD OIL COMPANY
Boston, Mass.—New York, N. Y.—Elizabeth, N. J.—Philadelphia, Pa.—Baltimore, Md.—Richmond, Va.—Charlotte, N. C.—Columbia, S. C.—Memphis, Tenn—New Orleans, La.

This month Dr. Oscar Horger demonstrates that wide area contact is one reason why:

The taper makes TIMKEN® the only journal bearing that delivers what you expect when you buy a roller bearing

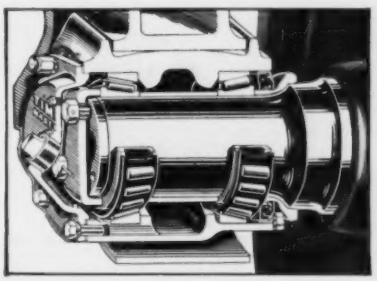


YOU put roller bearings on railroad journals to end the hot box problem and cut operating and maintenance costs to a minimum. Other advantages are less important. The Timken® tapered roller bearing is the *one* bearing you can count on to end the hot box problem and reduce costs. It's the taper! Here's why:

1) *Positive roller alignment.* The taper holds roller ends snug against the rib, where wide area contact keeps rollers properly aligned. There's no skewing of rollers to upset the full line contact.

2) *No lateral movement within the bearing.* Roller bearings are made to roll—not slide. In straight roller bearings, lateral movement pumps lubricant through the seal and out of the journal box, draws dirt and water in. Lateral movement also causes scuffing of rollers and races, shortens bearing life. And it makes auxiliary devices necessary to carry thrust. These are hard to lubricate, require extra maintenance. In Timken bearings, the taper prevents lateral movement, permits them to take thrust loads. There's no pumping action, no scuffing.

Get what you pay for when you switch to roller bearings to end the hot box problem and cut operating and maintenance costs to a minimum. Get Timken *tapered* roller bearings. The Timken Roller Bearing Company, Canton 6, O. Cable address: "TIMROSCO."



THE TAPER MAKES **TIMKEN** THE BEARING YOU TRUST

TRADE-MARK REG. U. S. PAT. OFF.

NOT JUST A BALL ○ NOT JUST A ROLLER ⊂⊃ THE TIMKEN TAPERED ROLLER ⊂⊃ BEARING TAKES RADIAL ◎ AND THRUST —◎— LOADS OR ANY COMBINATION —✳—